COMMONWEALTH MYCOLOGICAL INSTITUTE

C. A. B.
1-AUG 1952
FILE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXXI JULY 1952

POUND (G. S.) & STAHMANN (M. A.). **The production of a toxic material by Alternaria solani and its relation to the early blight disease of Tomato.**—*Phytopathology*, 41, 12, pp. 1104–1114, 4 figs., 1951.

At the Wisconsin Agricultural Experiment Station *Alternaria solani* [*R.A.M.*, 30, p. 392] produced on a modified Czapek's medium a toxic substance, apparently identical with alternaric acid, which caused chlorosis and necrosis when introduced into tomato plants either from lesions on the host or as a culture filtrate [cf. ibid., 28, p. 636; 30, p. 335]. The toxin exerted a comparable effect on cabbage, radish, spinach, sugar beet, tobacco, pea, bean [*Phaseolus vulgaris*], sweet clover [*Melilotus* sp.], cowpea, and poinsettia [*Euphorbia pulcherrima*] plants.

CARTWRIGHT (K. ST. G.). **Polyporus quercinus on Fagus sylvatica.**—*Trans. Brit. mycol. Soc.*, 34, 4, pp. 604–606, 2 pl., 1951.

A sporophore of *Polyporus quercinus*, collected from a living beech tree in Blenheim Park, Oxfordshire, in September, 1949, measured 15 by 12 cm. and up to 7 cm. thick. The basidia measured 14 to 24 by 6 μ and bore four subfusiform, pluriguttulate spores averaging 7 to 10 by 3 to 4 μ, white in the mass. In culture the chief characteristic was the massed production of terminal or intercalary secondary spores extremely variable in size and shape. Oidial formation was frequent, separation often occurring at a septum bridged by a clamp-connexion. Maximum size was 25 by 3·5 and 20 by 8 μ. Growth took place at 5° to 30° C., the optimum temperature being 20°.

The fungus produces a white rot, attacking both lignin and cellulose. Oak sapwood blocks exposed to infection for five months lost an average of over 25 per cent. oven-dry weight, and beech blocks 15 per cent. The highest percentage lost in one sample was 33 per cent. for oak and 24 for beech.

REDMOND (D. R.) & CUTTER (V. M.). **An example of synergistic growth inhibition between root-inhabiting fungi.**—*Mycologia*, 43, 6, pp. 723–726, 1 fig., 1951.

Mortierella alpina and two unidentified, non-sporulating imperfect species (A and B) were the fungi most commonly isolated in 1950 from dying roots of birch (*Betula lutea*) suffering from die-back [*R.A.M.*, 30, pp. 51, 52] at Lake O'Law, Nova Scotia. In studies at the Osborn Botanical Laboratory, Yale University, Connecticut, these isolates were grown singly and in all possible combinations in 20 ml. of liquid dextrose yeast medium, shaken continuously, at 23° C. The media from A and B grown separately inhibited growth of *M. alpina*. The inhibitory principle was not stable at 125°, but when A and B were cultured together a heat-stable product was synthesized which strongly inhibited growth of *M. alpina*. When these three isolates were segregated in cellulose bags suspended together in the shaken medium, or in alundum crucibles embedded in a common agar substratum

and of a porosity preventing the passage of hyphae through the pores, the inhibitory synergistic effect of A and B on *M. alpina* was again demonstrated.

WEAVER (L. O.) & JEFFERS (W. F.). **Oak wilt in western Maryland.**—*Plant Dis. Reptr*, 36, 1, p. 28, 1952. [Multilithed.]

Oak wilt (*Chalara quercina*) [*R.A.M.*, 31, p. 37 and next abstract] was found in Garrett county, western Maryland, on 19th July, 1951. Seven trees appeared to be infected in one area, but only a few had been killed in four years and there was no evidence of rapid spread. The disease was not present in 32 other locations in the State.

FOWLER (M. E.). **Oak wilt survey activities.**—*Sth. Lumberm.*, 183, 2291, p. 44, 1951.

As a result of survey activities in the eastern United States, the presence of oak wilt [*Chalara quercina*: see preceding abstract] has been demonstrated for the first time in western North Carolina and eastern Tennessee.

GILL (L. S.), LEAPHART (C. D.), & ANDREWS (S. R.). **Preliminary results of inoculations with a species of Leptographium on Western White Pine.**—*Spec. Release Div. For. Path., U.S. Dep. Agric.*, 35, 14 pp., 8 figs., 2 diags., 1951. [Mimeoprinted.]

At the commencement of the present investigations on pole blight of western white pine trees (*Pinus monticola*) [*R.A.M.*, 30, p. 496], several fungi were inoculated into short stem sections of healthy white pine in the laboratory. *Leptographium* sp. showed the greatest pathogenicity, producing fusiform areas, sunken in smooth-barked sections, of brown, necrotic bark a few days after inoculation, the wood beneath becoming stained bluish-black. Isolates 603 and 763 were selected for further inoculations on living trees.

In July and August, 1949, in Idaho and Washington, 196 large trees over 40 years old and supposedly susceptible, and 76 small ones about 25 years old and considerably younger than one would expect to be affected by pole blight in nature, all at least a mile distant from any known blighted stands, were inoculated at approximately two-week intervals with *Leptographium* cultures on malt agar and rice smeared over about ten needle punctures in the bark of the roots and stems. Root-section cultures were applied to roots only. In 1950 resin flow had resulted from 72 out of 96 inoculation sites on the lower trunks of large poles compared with four out of 44 on the upper stems of small poles. Of the 21 root inoculations examined, 20 were regarded as positive on the basis of extensive necrosis and resinosis. *Leptographium* sp. was reisolated from the wood surface as well as from the blue-stained area beneath. Inoculations with *Armillaria mellea* and *Poria weirii* all appeared to be negative.

MÜLDER (D.). **Neue Grundlagen für eine rationelle Abwehr des Kienzopfs (Peridermium pini).** [New bases for a rational defence against bark blister rust (*Peridermium pini*).]—*Forstw. Zbl.*, 70, 6, pp. 369–395, 1951.

The following are some of the conclusions arising from an exhaustive study of pine bark blister rust (*Peridermium pini*) in an experimental area in Oldenburg, Germany, with a view to the development of rational silvicultural methods for its control [*R.A.M.*, 29, p. 66]. The disease is of a chronic character, destructive attacks being unknown. Susceptibility increases slowly with age, only about 15 to 30 trees up to 30 years old being affected over an area of 0·25 ha., corresponding to 1 to 5 per cent. of the total number. At this stage there are usually only one or two foci of infection (four at most) per tree, but from the age of 35 onwards the percentage of diseased trees in a stand increases to 25 and the average number of

foci per tree to six, with a maximum of 50 foci. Individual differences in reaction to bark blister rust are pronounced, perfectly healthy trees having been observed in close proximity to hosts of many years' standing producing spores copiously. Indispensable for the maintenance of healthy stands and their preservation to a reasonable age is the unremitting search for foci of infection (best detected by the spindle-shaped swellings on the branches, visible all the year round).

HEIBERG (S. O.) & WHITE (D. P.). **Potassium deficiency of reforested Pine and Spruce stands in northern New York.**—*Proc. Soil Sci. Soc. Amer.*, 15, pp. 369–376, 1950 (published 1951). [Abs. in *Chem. Abstr.*, 46, 4, p. 1689, 1952.]

Starvation of young conifer plantings was observed on sandy soils on a terrace of glacial outwash on the outskirts of the Adirondack Mountains, New York. The site had been fairly intensively cultivated up to three years before the trees were planted. A strong growth response followed application of a complete commercial fertilizer, and in May, 1943 and 1946, the treatment of pine (*Pinus resinosa*) plots with potassium chloride gave similar results. Other symptomatically deficient plots of white pine (*P. strobus*) and spruce (*Picea abies* and *P. glauca*) were also benefited by the potassium treatments [cf. next abstract]. Chemical analyses of needle tissue collected in mid-September revealed a marked correlation between increased growth and a high potassium content, while another favourable factor was a preponderance of exchangeable potassium in the soils. The needle tissue of pines showing deficiency symptoms contained only 0·34 per cent. of potassium as compared with 0·45 to 0·74 per cent. in comparable material from healthy or fertilized trees. Deficient spruce tissue contained 0·13 to 0·21 per cent. potassium. The increase in annual height growth following potassium chloride at 200 lb. per acre ranged from 46 to 104 per cent. over the untreated plots, the effect of the 1943 amendment persisting in the 1949 growth.

GESSEL (S. P.), WALKER (R. B.), & HADDOCK (P. G.). **Preliminary report on mineral deficiencies in Douglas Fir and Western Red Cedar.**—*Proc. Soil Sci. Soc. Amer.*, 15, pp. 364–369, 1950 (published 1951). [Abs. in *Chem. Abstr.*, 46, 4, p. 1689, 1952.]

Western red cedar [*Thuja plicata*] in the Seattle district of Washington showed definite deficiency symptoms when lacking either nitrogen or phosphorus [cf. preceding abstract]. Douglas fir [*Pseudotsuga taxifolia*] was similarly affected only when deprived of nitrogen. Field fertilizing of young Douglas fir stands corrected the symptoms and increased the nitrogen content of the foliage. Romaine lettuce plants grown on two forest soils reacted in a striking manner to phosphorus amendments. Nitrogen response [of lettuce] was correlated with the support of good or poor growth of Douglas fir under forest conditions. The nitrogen content of foliage from trees making poor growth and displaying deficiency symptoms tended to be lower than in those developing more rapidly.

MAKI (T. E.) & HENRY (B. W.). **Root-rot control and soil improvement at the Ashe Forest Nursery.**—*Occ. Pap. sth. For. Sta.* 119, 23 pp., 1951.

Studies aimed at controlling root rot of pine and improving soil fertility and seedling size and quality were started in 1946 at the Ashe Forest Nursery, near Brooklyn, Mississippi. The rot, which is responsible for the heavy cull losses in four species of southern pines, *Pinus palustris* (longleaf), *P. caribaea* (slash), *P. taeda* (loblolly), and *P. echinata* (shortleaf), is believed to be caused by a nematode-fungus complex involving three species of fungi, *Torula marginata* [*R.A.M.*, 24, p. 296], *Sclerotium bataticola* [*Macrophomina phaseoli*: ibid., 30, p. 628], and *Fusarium* sp., and representatives of at least 10 genera of nematodes. Inoculation with these organisms, however, alone and in combination, failed to reproduce the

complete disease syndrome. Observations were confined to the first three pine species which were susceptible to different degrees. The disease, which could not be detected by superficial examination of seed-beds, was severe in spots; where loblolly showed 50 per cent. mortality, 95 per cent. of the slash pine was sometimes affected, though seed-bed mortality was light, and 90 per cent. or more of the spring-sown longleaf had to be culled. Excellent control of the disease over a three-year period was obtained with ethylene dibromide (dowfume W 40) [ibid., 30, p. 84], using a 20 per cent. (by volume) solution at 30 to 32 gals. per acre at a cost of five or six cents per 1,000 seedlings (based on an estimated production of 1,000,000 plantable seedlings per nursery acre). Sowing longleaf pine in the autumn also gave a satisfactory control, while sawdust, applied triennially with adequate complete fertilizer annually, at 135 cu. yds. per acre (1-in. deep layer) reduced incidence of disease very materially, at a cost of 18 cents per 1,000.

VERONA (O.). **Note sopra una malattia degli strobili di 'Pinus pinea' prodotta da 'Sphaeropsis necatrix'.** [Notes on a disease of the cones of *Pinus pinea* caused by *Sphaeropsis necatrix*.]—*Ann. Fac. agr. Pisa*, N.S., 11, pp. 193–236, 1 col. pl., 10 figs., 1 diag., 9 graphs, 1 map, 1950. [French, English, and German summaries. Received December, 1951.]

Information is presented on a disease of pine (*Pinus pinea*) cones occurring on the Tyrrhenian coast of Italy caused by *Sphaeropsis necatrix* [cf. *R.A.M.*, 27, p. 104], first described by Petri and Adani in *Ann. Accad. Agric. Torino*, 59, 1916, and by Petri in *Ann. Ist. sup. (agr.) for. naz.*, 2, 1917. The swollen and straw-like conditions are considered to be the spring and autumn phases, respectively, of the same disease. In the initial phase a chestnut-coloured lesion appears between two contiguous scales in May or June. In 24 to 30 hours a third of the cone may have turned brown, and soon after the whole surface is affected. A few days later the scale surface shrivels and curls and the cone turns a greyish colour owing to the partial separation of the epidermis, from which burst black, spherical or irregular pustules 0·1 to 1 mm. in diameter, singly or in clusters. The growth of the kernels is arrested so that at harvest time the cones are smaller than normal, wrinkled and dry. With the straw-like condition symptom development is similar but much slower, and the pines do not differ in weight or dimensions from healthy ones. In both cases the fungus was isolated from the affected tissues, and a study made of its vegetative morphology and physiology in culture.

The disease was found to be present also in pine woods on the Adriatic coast. It is more severe in wet years and attacks old pine forests in particular, possibly owing to a change in the chemical structure of the trees. It is aggravated by overcrowding and dense vegetation. Losses from the late attack may amount to approximately 100 to 150 million lira per annum in the Pisa region. Until further investigations on control by fungicides have been made the best method is to give the trees more light and aeration by timely pruning.

Canadian woods, their properties and uses.—Second edition. xv+367 pp., 98 figs., 20 diags., 18 graphs, Ottawa (issued under the authority of the Honourable Robert H. Winters, Minister of Resources and Development), 1951. $3.

The data for this book (first published in 1935) are drawn primarily from investigations at the Forest Products Laboratories Division of Canada. The work, which deals generally with the current uses and properties of all kinds of Canadian timber, includes a chapter (VI) by Clara W. FRITZ (pp. 161–180) on 'Decay and stains in wood', dealing with the dissemination, growth requirements, distribution, and identification of the fungi causing decay, its effect on the sale and utility of wood, conditions affecting service life, relative durability of various types of timber,

and descriptions of some common decay fungi and staining organisms. Chapter VII by J. F. Harkom deals with preservative treatment [*R.A.M.*, 30, p. 206] from the aspects of reasons for treatment (decay, insects, borers, weathering, etc.); development of the timber-preservation industry, common preservatives, processes and equipment [ibid., 30, pp. 397, 499]; durability of treated and untreated timber; economics of treatment, wood paints, coatings, and finishing; and furniture finishing. A bibliography of references appears at the end of each chapter.

Greaves (C.). **Preservative treatment of Douglas Fir and Western Hemlock sleepers in Canada.**—Forest Products Laboratories Division, Canada Department of Resources and Development, 13 pp., 2 pl., 1951. [Mimeographed.]

In this paper, prepared for discussion at the First Annual Convention of the British Wood Preserving Association at Cambridge, 25th to 27th June, 1951, the author deals with various preservative treatments for sleepers of Douglas fir [*Pseudotsuga taxifolia*] and western hemlock [*Tsuga heterophylla*] in Canada and the United States [*R.A.M.*, 30, pp. 206, 499; 31, p. 2]. Specifications issued by the American Wood Preservers' Association [ibid., 31, p. 157] include conditioning either by air-seasoning or by heating in the preservative at a maximum temperature of 210° F. for a maximum duration of six hours for seasoned sleepers and no limit for green ones, or by a combination of the two methods; incising; and impregnation by the empty or full-cell method, the temperature during the pressure period not to exceed 210°, with a pressure of no more than 150 lb. per sq. in. An expansion bath may follow but temperature must not exceed 220°. Retention of any of the recommended preservatives, creosote, creosote coal tar, and creosote petroleum, should be 8 lb. per cu. ft.

The average service life of creosoted Douglas fir and western hemlock sleepers in Canada is estimated at 25 years.

Liese (J.). **Wie kann die Gebrauchsdauer imprägnierter Hölzer wesentlich verlängert werden?** [How can the service life of impregnated timbers be substantially prolonged?]—*Technik*, 6, 5, pp. 223-225, 1951.

The increasing scarcity of timber in Germany necessitates a wider application of chemical protectives against decay by wood-rotting fungi and insects, and much valuable information is here presented on the correct choice of species for different purposes, e.g., beech in preference to pine for dredger timbers; proper maintenance of the timber before impregnation; precautions to be observed in the use of impregnated wood; and after-care [cf. next abstract]. At the last inspection in 1940 of an experimental section of railway track laid with winter-felled beech sleepers treated with coal tar oil (full-cell process) in 1897, there was no trace of any kind of injury, and one of the intact sleepers transferred to the courtyard of the Eberswalde College has remained in perfect condition to date. Experts taking part in the inspection were of opinion that an average service life of 80 years could be anticipated for sleepers treated by this method, which involves the absorption of about twice as much preservative as the economical Rueping process [*R.A.M.*, 24, p. 348] now in use.

Greater attention should be paid in future to the applicability of a given treatment to a particular kind of wood, especially in the case of spruce and pine telegraph poles.

The utmost importance should be attached to the maintenance of proper pretreatment storage. Thus, pine wood contaminated by blueing fungi [ibid., 31, p. 42] cannot be impregnated with coal tar oil successfully unless the temperature is raised to 90° or 100° C., and even then there may be further spread of already established infection. Moreover, the temperature of salt mixture solutions does not

normally exceed 50° to 60°. It is still more important that beech wood should be free from two defects which partially or entirely preclude impregnation even under maximum pressure. One is the occlusion of the xylem vessels by tyloses. The other, 'red heart' [ibid., 28, p. 551], is the result of a similar, purely physiological process, which occurs, however, during the lifetime of the tree and is much more active.

Under the prevailing conditions of stringency the after-care of treated wood is assuming ever greater importance. Poles may be wrapped at the danger point of soil-level with bandages soaked in sodium fluoride or UA salt mixtures [ibid., 15, p. 546; 20, p. 505], the latter being particularly valuable where resistance to leaching is a primary consideration. Similar materials are suitable for the tops of wooden industrial structures, e.g., cooling towers, while plugs saturated with potassium fluoride may be inserted into the old screw holes in poles and sleepers.

DIEHL. **Lebensdauer von getränkten und ungetränkten Holzschwellen nach bayerischen Erfahrungen.** [Duration of life of impregnated and non-impregnated wooden sleepers according to Bavarian observations.]—*Glasers Ann. Gew.*, 75, 5, pp. 104–107, 2 graphs, 1951.

Data are given on the service life of sleepers on experimental sections of the Bavarian State Railway [cf. preceding abstract]. The average period for [unspecified] fir ranged from about 18 to 22 years, the longer life being achieved by impregnation with a mixture of 2 per cent. zinc chloride and 8·5 per cent. creosote oil. The admixture of creosote or tar oil with pure salt solutions increases the longevity of pine sleepers from 18·5 years for zinc chloride alone by at least 10 to 20 per cent. Of 474,500 pine sleepers treated with substitutes for coal tar oil and laid down between 1916 and 1921, 21·6 per cent. treated with sodium fluoride required replacement after 12 years, the corresponding figures for zinc chloride and fluoxyl (sodium fluoride with 10 per cent. high boiling creosols) being 5·9 and 1·3 per cent., respectively.

Copper and mercury salts proved ineffectual for the treatment of beech sleepers, which were protected from decay for 22·6 years by impregnation with a mixture of 2 per cent. zinc chloride and 17·6 per cent. creosote oil. Untreated oak sleepers were still sound after 18 years on the track.

BLEW (J. O.). **Comparison of wood preservatives in Mississippi post study (1951 Progress Report).**—*Rep. For. Prod. Lab., U.S. Dep. Agric.*, R 1757 (revised), 11+2 [unnumbered] pp., 1951. [Mimeographed.]

In the service test in progress at the Harrison Experimental Forest, Saucier, Mississippi [*R.A.M.*, 28, p. 100 and next abstract] it is stated that on a basis of removals to date and of the preservative retentions used, southern yellow pine [*Pinus* spp.] fence posts pressure-treated with beta-naphthol in oil, borax-boric acid, 10 per cent. coal tar creosote plus 90 per cent. used crank-case oil, crank-case oil alone, and sodium chromate, and those treated at the ground line and top with osmoplastic (a mixture of sodium fluoride, dinitrophenol, potassium bichromate, refined coal tar, and coal tar creosote) are estimated to have an average life of 12 to 15 years. Those pressure-treated with chromated zinc chloride, lignite coal-tar creosote, No–D–K (hardwood-tar creosote), P.D.A. [loc. cit.], sodium bichromate, and tanalith, steeped in mercuric chloride, or treated full-length with osmosar (sodium fluoride, dinitrophenol, potassium bichromate, sodium arsenate, and gum arabic) are estimated to have an average life of 16 to 22 years. Those pressure-treated with celcure, coal tar, coal tar creosote, coal tar creosote plus used crank-case oil (50:50), pentachlorophenol and tetrachlorophenol (both at approximately 5 per cent. and 3 per cent. in used crank-case oil), water-gas tar, zinc chloride, and zinc meta arsenite, and those treated by double diffusion [ibid., 21, p. 107] with

copper sulphate and sodium arsenate are estimated to have an average life of over 22 years. Failures of treated posts were heavier in dry and damp areas than in swamps, but where there were over 30 per cent. failures the percentage in the swamps was significantly high.

BLEW (J. O.). **Comparison of wood preservatives in stake tests (1951 Progress Report).**—*Rep. For. Prod. Lab., U.S. Dep. Agric.*, D 1761, 7+26 [unnumbered] pp., 1 fig., 1951. [Mimeographed.]

The stake tests begun in 1938 by the Forest Products Laboratory and co-operators [*R.A.M.*, 29, p. 69] have shown that the untreated 2 by 4 in. sapwood stakes of southern yellow pine [*Pinus* spp., cf. preceding abstract] have had an average life of five to six years at Madison, Wisconsin. Untreated Douglas fir [*Pseudotsuga taxifolia*] plywood stakes installed at Saucier, Mississippi, have had an average life of one to four years, and those cut from lumber slightly over two. Superficial treatments by dipping and brushing with preservatives such as coal tar creosote and petroleum oils containing copper naphthenate, zinc naphthenate, phenyl mercury oleate, and pentachlorophenol added from a few months to four years to the life of the stakes. Zinc chloride, chromated zinc chloride, tanalith, and sodium pentachlorophenate afforded less protection than standard preservative oils when retentions corresponded to those in commercial use.

In the Panama Canal Zone southern yellow pine stakes treated with approximately 0·5, 0·75, and 1 lb. chromated zinc chloride per cu. ft. averaged five, seven, and seven years, respectively, and those treated with 1·5 lb. zinc chloride per cu. ft. about five to seven years. Stakes treated with approximately 0·25 lb. per cu. ft. of either sodium pentachlorophenate or sodium tetrachlorophenate lasted seven and five years, respectively. Those treated by double diffusion [see preceding abstract] with copper chromate and copper arsenate are in good condition after nine years in Mississippi.

BOVAY (H. E.) & ROBERTSON (R. B.). **New wood treating plant.**—*Sth. Lumberm.*, 183, 2291, pp. 41–42, 2 figs., 1951.

A detailed description is given of a new wood-treating plant of the Southern Pine Lumber Company at Diboll, Texas. The timber is first air-dried in the yard where poles are trimmed in a pole peeler machine, or steamed in the treating cylinders over night. It is first pressure-vacuum treated with creosote [*R.A.M.*, 30, pp. 206, 353, 499] in an 8 by 82 ft. cylinder and then with pentachlorophenol [ibid., 30, p. 396] in another cylinder 8 by 42 ft.

So far the plant has proved to be a great success, production having increased to a maximum and waste reduced to a minimum by reduced leakage and greater waste reclamation.

HUSSAIN (S. M.). **Dry-rot in building timber.**—*Pakistan J. For.*, 1, 1, pp. 51–54, 1951.

Lenzites sepiaria [*R.A.M.*, 21, p. 399] is stated to be the only agent of dry rot hitherto recorded on building timber in India; in Pakistan no mycological studies on the subject have yet been carried out.

Report of the Forestry Department, Gold Coast, for the year 1950–51.—24 pp., 1 col. map, 1951.

On p. 6 of this report [cf. *R.A.M.*, 28, p. 161] it is stated that the root fungus *Phaeolus manihotis* [ibid., 12, p. 352] continued to cause damage in Achimota Plantation; 4,832 diseased *Cassia siamea* trees were removed.

Pound (G. S.) & Walker (J. C.). **Mosaic resistance in Cabbage.**—*Phytopathology*, 41, 12, pp. 1083–1090, 2 figs., 1951.

In the course of further work at the Wisconsin Agricultural Experiment Station on selection for resistance to cabbage mosaic virus [*R.A.M.*, 27, p. 269; 30, p. 297] within types resistant to yellows (*Fusarium*) [*conglutinans*] [ibid., 28, p. 103], highly resistant lines were developed within Wisconsin All Seasons, Wisconsin Ballhead, and Wisconsin Hollander, each of which contains single-gene resistance to *F. conglutinans*. Resistance to the mottle phase (A) of cabbage mosaic virus was incompletely dominant. The F_1 progenies of mottle-resistant × mottle-susceptible crosses were closely similar to the resistant parent progeny in disease index and in population distribution in disease classes. The F_2 plants were intermediate between the parent progenies in disease index, but the distribution in disease classes showed a skewness in the direction of that of the resistant parent, and the same trend was noticeable in most of the F_3 populations of each cross. These data suggest that resistance is polygenic but controlled by relatively few gene pairs.

In crosses between resistant plants derived from different lines of Wisconsin All Seasons, resistance was maintained in the F_1, F_2, and F_3 generations. In crosses between resistant Wisconsin All Seasons and susceptible Wisconsin Ballhead, selections among segregating F_3 populations produced resistant lines with Ballhead characters as well as susceptible ones of the All Season type. Evidently, therefore, it is easy to develop resistant lines by hybridization of resistant and susceptible varieties, followed by selection.

Resistance to the chlorosis (B) component of the mosaic virus was also incompletely dominant and appears, from the scanty available evidence, to be inherited quantitatively. Resistance to this phase of the disease is independent of the same reaction to mottle, since lines have been obtained in which resistance to mottle is combined with susceptibility to chlorosis.

Henkens (H.). **Een bacterie-ziekte in Stoppelknollen.** [A bacterial disease of Turnips.]—*Tijdschr. PlZiekt.*, 57, 4, pp. 124–126, 3 figs., 1951. [English summary.]

In 1949 foliar yellowing, followed by root rot, was prevalent in turnip fields in the southern provinces of Holland. Yields were low and the turnips did not keep. *Erwinia carotovora* [*R.A.M.*, 27, p. 591] was isolated from the diseased material and inoculated into the leaves and roots of healthy seedlings with positive results. Symptoms also developed on plants grown in naturally contaminated soil, beginning on the lower leaves.

Quantz (L.). **Eine Virose der Erbse und anderer Leguminosen.** [A virosis of the Pea and other Leguminosae.]—*Phytopath. Z.*, 17, 4, pp. 472–477, 3 figs., 1951.

A virosis of peas which occurred in an exceptionally severe form in Germany during the summer of 1950 was identified as pea enation mosaic [*R.A.M.*, 30, p. 355 and next abstract]. The disease was prevalent on culinary and field peas and locally, e.g., in Lower Saxony, on sweet pea and crimson clover. Besides those hosts, already reported in the literature, Dieckmann's smooth pea [*Lathyrus tingitanus*], vetch, and *Vicia villosa* were either naturally or artificially infected (sap transmission). Sweet pea petals were covered with well-marked pale to whitish spots in addition to the roughened areas described by Ainsworth [ibid., 19, p. 561]. The leaflets of crimson clover are often undulating to corrugated in consequence of the development of oblong spots and stripes, commonly necrotic or forming enations on the under side. Curvature of varying extent, a faint mottling, and elongated, translucent striations are the symptoms of infection on vetch leaves.

The sudden widespread appearance of the virus in Germany is difficult to explain.

Possibly it may be identical with one of the two types observed by Böning on peas in experimental plots near Bonn in 1927 [ibid., 7, p. 134], characterized by comma-shaped, pale spotting of the leaves.

In a few preliminary tests the virus was transmitted from naturally diseased to healthy pea plants by *Macrosiphum pisi*. Transmissibility through the seed [see next abstract] is suggested by the distribution of the virus in the stand, beginning with a few scattered plants which as the season advances form more compact, often heavily infected blocks, especially in small plots.

QUANTZ (L.). **Untersuchungen über das Erbsenvirus 1 ('Enation'-Mosaik-Virus). I. Seine Wirtspflanzen, Ausbreitung und Überwinterung.** [Studies on Pea virus 1 ('enation' mosaic virus). I. Its hosts, dissemination, and overwintering.]—*NachrBl.dtsch.PflSchDienst* (*Braunschw.*), 4, 2, pp. 24–27, 3 figs., 1 graph, 1952.

No conclusive evidence of the transmissibility of pea enation mosaic virus through the seed [see preceding abstract] was obtained in experiments in Germany with the 1950 crop, involving the inoculation of 2,400 seeds of three varieties with 60 collections of the virus. Two further hosts [loc. cit.] were detected, namely, lentil and yellow lupin. From observations in 1950 and 1951 on the natural cycle of infection it appears that crimson clover and *Vicia villosa* carry the disease from mid-September to the beginning of May. Susceptible summer crops, such as peas, broad beans, and vetch, should not be planted in their vicinity, and the weeds should be cut and ploughed under at the earliest practicable date in the spring. A mixed crop of peas, broad beans, and vetch is infected from mid-July to mid-November, with a peak in late October; sweet pea carries the disease from the end of June to mid-November; and culinary and field peas and broad beans from the end of May to early September, with a sharp rise in July.

WATSON (R. D.), COLTRIN (L.), & ROBINSON (R.). **The evaluation of materials for heat treatment of Peas and Beans.**—*Plant Dis. Reptr*, 35, 12, pp. 542–544, 1951. [Multilithed.]

In tests of various media for use in the heat treatment of seeds of Tendergreen beans [*Phaseolus vulgaris*], Thomas Laxton peas, and Clarke bush Lima beans [*P. lunatus*] for the control of seed-borne pathogens at the Idaho Agricultural Experiment Station, seeds survived long periods of exposure to heat in carbon tetrachloride without serious reduction in their viability or germination, whereas they were killed in a relatively short time in water at the same temperature. Lima beans were more resistant to hot water than peas and beans. Hot carbon tetrachloride is not toxic to the seed and evaporates rapidly, leaving no harmful residues; it is not readily absorbed by the seed and does not cause the testa to slip.

GRAHAM (J. H.). **Preservation of three bacterial pathogens of Soybean in culture.**—*Plant Dis. Reptr*, 36, 1, pp. 22–23, 1952. [Multilithed.]

Of three methods tested for maintaining virulent cultures of *Xanthomonas phaseoli* var. *sojense*, *Pseudomonas glycinea* [*P. glycines*], and *P. tabaci* [*P. tabacum*], storage under mineral oil [*R.A.M.*, 29, p. 320] was more successful than storage at 4° to 8° C., all the isolates being alive and pathogenic after 29 months' storage at room temperature.

BROADBENT (L.), TINSLEY (T. W.), BUDDIN (W.), & ROBERTS (E. T.). **The spread of Lettuce mosaic in the field.**—*Ann. appl. Biol.*, 38, 3, pp. 689–706, 2 diags., 5 plans, 1951.

A full acount is given of a study made by epidemiological methods [*R.A.M.*, 28, p. 301] on two farms in Buckinghamshire during the years 1947 to 1950 of the

spread of lettuce mosaic, a shorter notice of which has already appeared [ibid., 31, p. 5]. One farm showed two types of spread, (1) within a crop from sources initiated by seed-borne virus, and (2) to a crop from infected old plants in the vicinity. The first caused serious losses only when aphids were exceptionally numerous and incidence of seed-borne infection high. Often there were more diseased plants near hedges, woods, trees, and buildings than in the open, presumably because such barriers halt flying aphids. *Macrosiphum euphorbiae* [loc. cit.] is a relatively inefficient vector, but is often numerous on lettuce in winter, and its apterae are highly mobile; it may, therefore, help to spread the virus throughout the winter crop. Alate *Myzus persicae* are probably the main carriers of the virus. Both species overwintered on lettuce crops and migrated from them in April and May.

Until clean seed is obtainable growers should make sure that they are using only the best by growing a few hundred seedlings before using a stock of seed in the field. Seed with over 0·5 per cent. infection may give a seriously reduced crop. Open sites are preferable to enclosed, and seed-beds should not be near hedges, woods, or buildings. Aphids should be destroyed on old infected crops before large number of viruliferous alatae are produced.

WELTE (E.). **Arbeitstagung über die Bekämpfung der Gurkenwelke.** [Working conference on the control of Cucumber wilt.]—Reprinted from *Erde u. Ernte, 1950,* 3, 2 pp., 1950. [Received March, 1952.]

The rapidly increasing severity of cucumber wilt, caused by a *Fusarium* of the *Elegans* group, in Germany [*R.A.M.*, 29, p. 346] and elsewhere [cf. ibid., 23, p. 373; 29, p. 607] led to the investigation of the disease at the Institute for Plant Protection, Hohenheim, Stuttgart.

Four different forms of the disease were observed in 1949, namely, (1) the familiar withering shortly followed (or occasionally accompanied) by the production on the stems of a pink to salmon-coloured coating of conidia; (2) collapse of young plants (or rarely of old ones) associated with softening and translucency of the stem base and root-collar, succeeded by a brown discoloration, and culminating in a wet rot; (3) defective emergence; and (4) shortening of the internodes and consequent stunting.

The critical period for the development of severe infection generally coincides with the cutting of the first fruits six to seven weeks after planting out, corresponding to the time shown by W. Kosswig's inoculation experiments at the Bonn Phytopathological Institute to be requisite for the incubation of the fungus. Evidently, therefore, infection tends to occur immediately after planting out, before which the seedling should be carefully hardened and provided with every practicable stimulus to growth.

Signs of germinative weakness become apparent immediately after sowing and those of stunting in about three weeks, while collapse occurs after a month or so. An important precaution against these early phases of the wilt is the sterilization of the soil by steam or chemicals. The prompt and thorough destruction of all diseased plant residues bearing conidia is necessary to forestall the development of the highly resistant chlamydospores, and prevent soil infection. The incubation period following air-borne infection is eight weeks. Soil sterilization cannot prevent the development of new infections during the vegetative period, the plants requiring continuous protection by chemical compounds, among which a copper complex has given good results in practice, while laboratory experiments with quinosol and two new preparations of the Farbwerke Höchst were successful. Observations on varietal reactions to the disease suggest the possibility of using the comparatively resistant Produkta in crosses with desirable commercial varieties in a breeding programme. Domina, all the types resistant to spot [? *Pseudomonas lacrymans*: ibid., 29, p. 346], Orion, and Reform are susceptible. Trials are also planned on the

Dutch method of grafting on vegetable marrow, and experiments are proceeding in the inoculation of the soil with certain micro-organisms antagonistic to the wilt pathogen.

Reductions from *Fusarium* wilt in northern Württemberg in 1948 were computed at 8,140 out of 116,400 plants, representing a financial loss of DM. 81,400, while the 24,900 destroyed in 1949 were valued at DM. 235,600.

Evans (A. C.). **Entomological research in the Overseas Food Corporation (Tanganyika).**—*Ann. appl. Biol.*, 38, 2, pp. 526–529, 1951.

In the first year of production (1948–9) at Urambo, Tanganyika, the yield of groundnuts was reduced by an estimated figure of 40 per cent. as a result of rosette disease [*R.A.M.*, 31, p. 7]. In the Southern Province the disease has not so far been serious, but examinations of native gardens indicate that it may prove dangerous in the near future. Isolated affected plants have occasionally been found at Kongwa.

At Urambo the evidence indicated that the infected vectors [*Aphis craccivora*] were blown in on the prevailing easterly winds from the extensive areas of native cultivation which begin about 13 miles to the east and extend to Tabora, 45 miles further east.

In an experiment carried out at Urambo plantings made on 18th and 27th December did not become heavily infected, but later plantings (2nd, 10th, 19th, and 29th January) were progressively more severely attacked, while subsequent plantings developed 100 per cent. infection. No reduction in the disease resulted from close spacing [cf. ibid., 30, p. 141], in spite of wide variations in the populations.

Of seven phosphorus-containing systemic insecticides tested, one, based on bis-bis dimethylamino phosphonous anhydride [ibid., 31, p. 159], protected the plants for 24 days from infestation by aphids applied every fifth day. Even after 40 days the insecticide was effective to some extent.

Blumer (S.). **Die Bekämpfung der Krankheiten und Schädlinge im Rebbau.** [The control of diseases and pests in viticulture.]—*Schweiz. Z. Obst- u. Weinb.*, 60, 9, pp. 173–179, 3 figs., 1951.

The prevailing financial stringency poses three important questions in connexion with the control of vine *Peronospora* [*Plasmopara viticola*] in Switzerland [*R.A.M.*, 31, p. 225], namely, whether copper can be (1) saved by a reduction in the number of treatments; (2) reduced in concentration or its efficiency increased by adjuvants; or (3) replaced economically.

Downy mildew develops in spurts, which are particularly dangerous at flowering time. A questionnaire circulated by the Zürich Viticultural Commission to 50 communities in 1950 elicited the reply from 26 that the critical period fell in the latter part of June. The first post-blossom treatment was the most important. Further spurts were recorded in July and even during August. The relatively mild form assumed by the disease of recent years would not justify a reduction of the pre-blossom treatments from two to one, more especially where 'rotbrenner' [*Pseudopeziza tracheiphila*: ibid., 31, p. 49] is prevalent. The striking regression in the incidence of this pathogen is probably attributable to the systematic and thorough application of the early sprays as well as to climatic factors. In general, 1 per cent. Bordeaux mixture should suffice for the early treatments and 1·5 per cent. for the later; the question of possible reductions in strength should be reconsidered in an epiphytotic year. More attention should certainly be paid to the correct timing and mode of application of the sprays, errors in which cannot be retrieved by an increased concentration of the fungicide. Further experiments are also necessary

to confirm the results obtained by Hadorn [ibid., 22, p. 341 *et passim*] and others with the various substitutes designed to save copper.

Oidium [*Uncinula necator*; ibid., 31, p. 223] has become more prevalent of recent years, especially near Lake Zürich. Sprays or dusts for its control were applied in 26 communities during 1950.

Much heavier damage was caused, however, by *Botrytis cinerea* [cf. ibid., 31, p. 167] than by either of the mildews. Favoured by rainy weather in mid-September, its prevalence increased progressively and it was reported from Wädenswil that scarcely a grape of the Riesling × Sylvaner variety was free from damage, which was assessed at 60 to 80 per cent., the corresponding figure for Blue Burgundy in the same district being 25 to 55 per cent. Green mould (*Penicillium*) [cf. ibid., 28, p. 49] was also present, and considerable losses were caused by these fungal rots and bacterial invasion. The difficulties in the way of direct control of *B. cinerea* [ibid., 31, p. 49] in the vineyard seem to be almost insuperable [but see ibid., 27, p. 272], and strict attention should therefore be paid to indirect measures, such as the prevention of injuries, sparing use of nitrogenous fertilizers, especially dung, and provision for proper air circulation, in which the thorough eradication of weeds is of great importance.

Panfilova (Mme. T. S.). Борьба с пятнистым антракнозом Винограда в Средней Азии. [Control of spotted anthracnose of Vines in Central Asia.]—Винод. & Виноград, СССР [*Viniculture & Winemaking, U.S.S.R.*], *1950*, 7, pp. 27–28, 1950.

The characteristics and morphology of *Gloeosporium ampelophagum* [*Elsinoe ampelina*: C.M.I. map No. 234; *R.A.M.*, 30, p. 98] are described. Under Central Asian conditions the fungus overwinters mostly in the tissue of the infected shoots, where it remains viable for three to five years. Its spread is checked by insufficient humidity during the summer.

Studies at the Central Asian branch of the Magarach Institute, U.S.S.R., have shown that the conidia can germinate from 11° to 40° C., 23° to 32° being optimum, but above 30° they produce very small, almost bacteria-like buds. The results of inoculation experiments on the young, easily susceptible parts of the shoots indicate that the intensity of infection, the duration of the incubation period of the disease, and even the developmental character of the anthracnose spots are all influenced by temperature. The shortest incubation period occurs between 24° and 30°, above which there is a decreased development of spots and the shoots are less affected. The younger the shoots and leaves the more susceptible they are and the shorter the incubation period required.

According to biological and ecological studies control of the fungus would be most advantageous early in the spring just before the buds swell. However, in Central Asia sprays are necessary in the autumn before the vines are covered for the winter. A treatment with 10 per cent. ferrous sulphate plus 1 per cent. sulphuric acid [ibid., 29, p. 494] is recommended during the dormant period. A time-table for these treatments is provided but they should be started two to three days earlier in extensive vineyards as it is very important to finish on time. Attention is drawn to the importance of cutting out diseased parts and general improvement in the care of the vines.

Yarwood (C. E.). **Deleterious action of water in plant virus inoculations.**—*Nature, Lond.*, 169, 4299, p. 502, 1952.

In studies at the University of California, when tobacco mosaic virus inoculum in water was allowed to dry in an inoculating brush and the dry brush stroked over carborundum-dusted dry leaf surface of bean (*Phaseolus vulgaris*) [see next

abstract], 1,145 lesions resulted, as against 357 from comparable wet inoculations. Dry inoculation has, however, the disadvantage that no successful method of quickly recharging the brush with dry virus has so far been devised.

When bean leaves were dry-inoculated with tobacco mosaic virus and left dry 1,290 lesions developed, as against 200 on those immediately sprayed with water. When leaves were inoculated by the wet method and dried within ten seconds by air blast, 1,740 lesions resulted, as against 242 on leaves allowed to dry naturally, the corresponding figures for [tomato] spotted wilt virus on bean being 208 and 24, and on tobacco 172 and 44.

When carborundum-dusted bean leaves were brushed with a clean, dry brush and then dipped in tobacco mosaic virus inoculum 297 lesions appeared, as against 37 on leaves rubbed wet, the corresponding figures for tobacco necrosis virus on bean [loc. cit.] being 104 and 18.

Wet inoculation [with tobacco mosaic virus] of detached bean leaves previously wilted to from 90 to 95 per cent. of their original green weight gave 712 lesions, as compared with 181 on turgid leaves. Wilting to from 65 to 95 per cent. of the original green weight after wet inoculation resulted in 5,710 lesions as against 2,452 on turgid leaves, the corresponding figures for tobacco necrosis virus being 265 and 48 [cf. *R.A.M.*, 28, p. 252].

YARWOOD (C. E.). **Some relations of carbohydrate level of the host to plant virus infections.**—*Amer. J. Bot.*, 39, 2, pp. 119–124, 1 fig., 3 graphs, 1952.

In experiments at the Division of Plant Pathology, University of California, Berkeley, leaves of tobacco inoculated with tobacco mosaic virus [*R.A.M.*, 31, pp. 149, 211], of tobacco and sunflower inoculated with tobacco ring spot virus [ibid., 30, pp. 632 and 575, respectively], and of Pinto bean (*Phaseolus vulgaris*) with white clover mosaic virus [pea wilt plus pea mottle viruses: ibid., 21, p. 293] showed no definite symptoms when detached and kept at 25° C. in the dark floated on water or on sugar solutions, but the virus content in leaves on 10 per cent. sucrose was probably greater than on water. Tobacco mosaic and tobacco necrosis viruses on bean [see preceding abstract] produced conspicuous necrotic lesions, the size of which and the virus content of leaves kept on water for two to six days were 10 to 200 times larger and greater, respectively, than on 10 per cent. sucrose. A progressive decrease in lesion size occurred, though not at 19°, as the sucrose or glucose content was increased to 10 per cent. Detached *Nicotiana glutinosa* and bean leaves inoculated with tobacco mosaic [ibid., 30, p. 506] and tobacco ring spot [ibid., 30, p. 416] viruses, respectively, showed conspicuous necrotic lesions when incubated on 10 per cent. sucrose at 25° and 28°, but not on water. The virus concentration of the former was similar on both solutions, while that of the latter was greater on sucrose than on water. Larger tobacco mosaic virus lesions with a higher virus content were produced on inoculated bean leaves which were detached in the early morning than on those taken in the late afternoon. Lesion size and tobacco mosaic virus content of inoculated leaves of greenhouse bean plants were intermediate between those on water and those on 10 per cent. sucrose. Detaching inoculated leaves and placing them on water at 25° in the dark decreased the total number of lesions formed, while placing them on 10 per cent. sucrose had no apparent effect on lesion number. Placing bean leaves in the dark before inoculation increased the number of lesions of tobacco mosaic virus, while placing them there afterwards decreased the number but increased their size. Inoculated bean leaves from cut shoots in sugar solution produced smaller tobacco mosaic virus lesions when placed on water than those from shoots not given any sugar. Development of bean rust (*Uromyces phaseoli*) [*U. appendiculatus*: ibid., 30, p. 575], but not virus multiplication [ibid., 30, p. 215], was checked by placing rusted leaves on water at 25° C. in the dark.

Braun (A. C.) & Maramorosch (K.). **A method for obtaining saliva from certain leafhoppers.**—*Phytopathology*, 41, 12, pp. 1126–1128, 1 fig., 1951.

Saliva procured from the leafhopper vectors of plant viruses of the aster yellows [*R.A.M.*, 31, p. 221] type appeared to offer the most hopeful prospect for *in vitro* studies of their properties, and at the Rockefeller Institute for Medical Research, New York, attempts were therefore made to induce salivation without the immediate stimulus of food. Viruliferous individuals of *Macrosteles divisus* were cemented, back downwards, on glass slides by means of a drop of cellulose dissolved in acetone, the wings and legs being immobilized while the head was free to move. The saliva extruded for a period of several hours was removed with a capillary pipette attached to a Chambers micromanipulator. A small quantity of saliva was then dissolved in a drop of neutral buffered saline and injected by Black's method [ibid., 20, p. 209] into 31 virus-free individuals, four of which proved to be infective within six weeks of inoculation, while 20 untreated from the same stock culture were virus-free. The saliva was comparatively free from the contaminants associated with the juices from macerated infective plant or insect tissues.

The same procedure was successfully applied to *Dalbulus maidis*, the vector of maize stunt [virus: ibid., 31, p. 61].

Weaver (E. P.) & Price (W. C.). **Differentiation of Tobacco mosaic virus strains by complement fixation.**—*Proc. Soc. exp. Biol., N.Y.*, 79, 1, pp. 125–127, 1952.

The results of tests at the Plant Virus Laboratory, University of Pittsburgh, with purified preparations of the type and rosette [*R.A.M.*, 31, p. 302] strains of tobacco mosaic virus and five laboratory strains [cf. ibid., 31, pp. 90, 211] derived by mutation from the type, and rabbit antisera of each show that the complement fixation reaction serves for the differentiation of mutants. In some cases antibody remaining after absorption of specific antiserum with heterologous antigen could be detected by complement fixation in the presence of homologous antigen. In one instance a significantly lower antiserum dilution end point was attained in the heterologous than in the homologous. Finally, the strains were found to differ in optimum antigenic units, i.e., the weight of antigen required to react optimally with specific immune serum, which ranged from 2·8 μgm. for the type to 7 μgm. for one of the mutants.

Antiserum for the type strain failed to react with southern bean mosaic [ibid., 31, p. 218] or tomato ring spot [ibid., 28, p. 492] viruses. Antiserum for southern bean mosaic reacted with the homologous virus with an antiserum dilution end point of 1:20, but not with the type or rosette strains of tobacco mosaic or with tomato ring spot virus, thus providing additional evidence for specificity of the reaction.

Matthews (R. E. F.). **Effect of purines on the multiplication of plant viruses.**—*Nature, Lond.*, 169, 4299, pp. 500–501, 1952.

Adenine, guanine, and hypoxanthine at 0·01 *M* concentration, when sprayed on to leaves before inoculation with viruses, reversed the inhibitory activity of guanazolo (0·005 *M* in 0·1 per cent. sodium bicarbonate) [*R.A.M.*, 30, p. 447] on the development of lucerne mosaic virus in *Nicotiana glutinosa* or tobacco, though xanthine, uric acid, theobromine, theophylline, caffeine, uracil, thymine, and urea did not. Experimental evidence suggested the possibility that the viruses of lucerne mosaic and tobacco mosaic may be able to utilize free adenine and guanine and that hypoxanthine, the most effective reverser of inhibition, may be a precursor of guanine and perhaps of adenine in normal virus synthesis. Guanazolo may, perhaps, act by interfering with the incorporation of guanine and possibly adenine into the virus or by being built directly into the virus in place of guanine.

Beale (Helen P.) & Jones (Carolyn R.). **Virus diseases of Tobacco mosaic and Potato yellow dwarf not controlled by certain purified antibiotics.**—*Contr. Boyce Thompson Inst.*, 16, 8, pp. 395–407, 1 fig., 1951.

At the Boyce Thompson Institute, New York, solutions of the purified antibiotics sodium penicillin, streptomycin sulphate, chloramphenicol (chloromycetin), aureomycin hydrochloride, and sodium terramycin [*R.A.M.*, 30, p. 281] were introduced into Turkish tobacco and *Nicotiana rustica* by means of a single glass wick fibre threaded through the stem. The plants were afterwards inoculated with tobacco mosaic and potato yellow dwarf viruses, respectively. In one test Turkish plants were treated on successive days with streptomycin, aureomycin, and penicillin in repeated doses before being inoculated. The antibiotics were also mixed *in vitro* with tobacco mosaic virus and the mixture assayed on *N. glutinosa*. Under the experimental conditions none of the antibiotics used controlled either virus (Abs. in *Phytopathology*, 41, p. 23, 1951) [cf. loc. cit.].

Bericht über die 57. Mitgliederversammlung (Generalversammlung) der Deutschen Botanischen Gesellschaft in Tübingen. Mai/Juni 1950. [Report on the 57th convention of members (general convention) of the German Botanical Society at Tübingen, May–June, 1950.]—*Ber. dtsch. bot. Ges.*, 63, *Generalversammlungsheft*, 42 pp., 1950.

Among the subjects discussed at the general convention of the German Botanical Society in 1950 were the results and problems of research on bacterial mutation by R. W. Kaplan (pp. 12–14); the pathology of nuclear division by H. Marquardt (pp. 15–16); some problems of virus research by G. Melchers (pp. 18–23); virus diseases and plant protection by H. Uschdraweit (pp. 27–28) [cf. *R.A.M.*, 29, pp. 320, 602]; the importance of modern virus research to the potato-breeder by [Ingeborg] v. Bernuth (p. 28); and the importance of serology in potato virus research and control by C. Stapp (pp. 28–29) [cf. ibid., 28, p. 637].

Twenty-fifth Annual Report of the Department of Scientific and Industrial Research, New Zealand (1950–51).—80 pp., 1951.

Reporting the work of the Plant Diseases Division (pp. 51–56) [cf. *R.A.M.*, 30, p. 361] G. H. Cunningham records that four of the nine principal potato varieties in New Zealand showed high resistance to or immunity from *Verticillium* wilt [*V. albo-atrum*: ibid., 16, p. 631], and five of nine strawberry varieties were resistant or highly resistant [cf. ibid., 29, p. 571]. Evidence was obtained indicating that yellow leaf of *Phormium* flax [*P. tenax*] may be due to a virus [ibid., 30, p. 362]. Crown gall [*Bacterium tumefaciens*: loc. cit. and below, p. 322. Hosts unspecified] has only recently become important in New Zealand; puratized gave complete control without injuring the plants [cf. ibid., 29, p. 146; 31, p. 106]. Tomato canker [*Corynebacterium michiganense*: ibid., 30, p. 361] is becoming a major disease in some localities; Bordeaux and cuprox sprays substantially reduced infection and rate of spread. Incidence of potato scab [*Actinomyces scabies*: ibid., 16, p. 631] was lowest following sulphur applications [ibid., 31, p. 139], which reduced the soil pH to from 3·1 to 3·6 but caused severe skin damage. Grass clippings gave the next best control. At Palmerston North pea mosaic virus was found on subterranean clover [*Trifolium subterraneum*] and red clover [cf. ibid., 30, p. 355], while a mixture of lucerne mosaic virus strains was confined almost entirely to white clover [ibid., 30, p. 447]. The legume virus widespread in *Gladiolus* in New Zealand was identified as pea mosaic virus, while the white break or blotch flower symptom was caused by cucumber mosaic virus [cf. ibid., 25, p. 330; 30, p. 416].

In the section on soil microbiological work at Canterbury Agricultural College (p. 75) I. D. Blair states that *Cercosporella herpotrichoides* [ibid., 29, p. 15] has

been demonstrated to persist in [cereal] straw for over two years; the presence of organic forms of nitrogen is an important contributory factor to its survival.

First Annual Report of the Scientific Department, Overseas Food Corporation, East Africa, Crop Season 1947–48, 56 pp., 2 graphs, [? 1949].

This report appeared as appendix V (pp. 97–153) to the full Annual Report, to 31st March, 1949. In the sections on plant protection (pp. 25–26 and 54–55) it is stated that up to 30 per cent. infection of groundnuts with crown rot (*Aspergillus* sp.) [*A. niger*: *R.A.M.*, 31, p. 47] was reported from some of the wetter areas of Unit 2 at Kongwa, Tanganyika. Inadequate burying of grass may influence the incidence of the disease, which is localised in former grassland areas. In certain areas it was suspected that an unspecified fungus attack on early matured nuts during March caused them to germinate prematurely. At harvest the proportion attacked by fungi was 10 per cent., and of these approximately 15 per cent. germinated compared with only 1½ per cent. of the healthy nuts. Rosette [virus] disease [see above, p. 15] was generally present in the Southern Province of Tanganyika and in a trial of 25 varieties infection was estimated at 1,000 plants per acre. Aphid infestation, though definite, was slight. In native plantings in the Masasi area the number of virus-diseased plants varied from 250 to 3,250 per acre.

On sorghum, grain smut (*Sphacelotheca sorghi*) [ibid., 30, p. 196; 31, p. 33] and head smut (*S. reiliana*) [ibid., 28, pp. 378, 595] were fairly common, and downy mildew (*Sclerospora sorghi*) [C.M.I. map No. 179] and rust (*Puccinia purpurea*) [ibid., No. 212] were common. Some heads infected with long smut (*Tolyposporium ehrenbergii*) [*R.A.M.*, 29, p. 152] were noted.

Fernando (M.) & Stevenson (Greta). **Studies in the physiology of parasitism. XVI. Effect of the condition of Potato tissue, as modified by temperature and water-content, upon attack by certain organisms and their pectinase enzymes.** —*Ann. Bot., Lond.*, N.S., 16, 61, pp. 103–114, 1952.

In studies at the Plant Pathological Laboratory, Imperial College of Science and Technology, London, peeled, sterilized tubers of King Edward potatoes were cut with a flamed knife and the cut surfaces spread with inoculum of *Bacterium carotovorum* [*Erwinia carotovora*], *Bacillus subtilis*, *B. megatherium*, *B. mycoides*, and *Botrytis cinerea*, respectively. Enzymic preparations of the bacteria were obtained from the expressed juice from rotted tissue and comparisons of enzymic activity were made by noting the time required (reaction time) for the maceration of potato disks ½ mm. thick. *E. carotovora* strongly attacked potato tissue at ordinary temperatures. *B. subtilis* and *B. megatherium* attacked all tubers at 37° C. and the latter at 30° as well. *B. subtilis* attacked normal potato tissue at ordinary temperatures when it was injected with water, there being a marked correlation between the amount of rotting produced and the enzymic activity of the rotted tissue extract. Both *E. carotovora* and enzymic preparations from it attacked potato tissue in its normal condition, although the efficiency of both was increased by water injection of the host tissue. The amount of tissue rotted by bacterial attack (average of seven half-tubers) after seven days at 24° was 0·93 gm. as against 14·1 gm. for the injected halves. In a similar experiment with 16 tubers and *E. carotovora* enzyme the corresponding weights after 24 hours were 0·22 and 0·71 gm., respectively.

A distinct qualitative difference was demonstrated between the pectinase enzymes of *Botrytis cinerea* and *E. carotovora*. Preparations of the latter enzyme, which were weaker than the former when tested on turgid potato disks of standard thickness, attacked normal (subturgid) potatoes, whereas the *Botrytis* enzyme did

not. Raising the water content by about 4 per cent. markedly increased the amount of attack by both organisms.

Rate of diffusion appears to be a limiting factor in the attack of potato tissue by preparations of pectinase enzymes.

GREGG (MARY). **Studies in the physiology of parasitism. XVII. Enzyme secretion by strains of Bacterium carotovorum and other pathogens in relation to parasitic vigour.**—*Ann. Bot., Lond.*, N.S., 16, 62, pp. 235–250, 3 graphs, 1952.

In further studies at the Plant Pathological Laboratory, Imperial College of Science and Technology, London, Dowson's strain 66D of *Bacterium aroideae* [strain of *Erwinia carotovora*: *R.A.M.*, 31, p. 174 and preceding abstract], *B. carotovorum* i and ii [*E. carotovora*] isolated from broccoli and tomato, and *Phytomonas* [*Xanthomonas*] *carotae* [ibid., 27, p. 506; 28, p. 57] isolated from carrot, showed diminishing pathogenicity in that order when inoculated into mature potato tubers of seven varieties and roots of turnip, swede, and carrot. Potato tubers were attacked most severely at 25° to 35° C., the severity diminishing gradually from 20° to 10°, below which rot ceased. Tuber susceptibility increased as they grew to full size but fell off during the dormant period. There was a considerable rise in susceptibility to strain 66D as the tubers reached the sprouting stage. Susceptibility was also increased by storage for some time at temperatures of about 35° or by raising the water content of the tubers, either by soaking or by direct injection. Similar responses to these treatments were given by enzymic preparations of the bacteria. The greater pathogenicity of 66D over the *carotovora* strains was associated with a greater rate of multiplication of the former under comparable conditions and with a greater tendency of the latter to an acid-forming type of metabolism which was unfavourable to multiplication of the organism and to the activity of its enzyme.

APPLER (H.). **Über die Tumorbildung durch Pseudomonas tumefaciens und durch Heteroauxin an Helianthus annuus.** [On tumour formation by *Pseudomonas tumefaciens* and heteroauxin on *Helianthus annuus*.]—*Biol. Zbl.*, 70, 9–10, pp. 452–469, 12 figs., 3 graphs, 1951.

At the Institute of Plant Physiology of Göttingen University, Germany, the life of the cotyledons of sunflower seedlings was prolonged by the application of 'stump' tumours, i.e., those arising on the stem-end surface of decapitated seedlings after inoculation with the *Chrysanthemum frutescens* IIB strain of *Pseudomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, 31, p. 106]. Under the influence of the neoplasms the cotyledons performed epinastic growth movements. The 'stump' tumours replace the correlative influence of the growing point and prevent the emergence of the axillary buds of the cotyledons. A growth substance extracted from tryptophane-containing media inoculated with *B. tumefaciens* was identified as heteroauxin. The epicotyl stump reacts to treatment with a cap of heteroauxin paste (10 mg. in 1 gm. lanolin) or with tryptophane by the production of tumours externally indistinguishable from those of crown gall and exerting comparable effects on the plants. A hyponastic habit of leaf growth was induced both by the presence of tumours on the cotyledons and by their treatment with heteroauxin paste. The thickening of the epicotyl caused by the tumours or tryptophane is traceable to intensive division of the cambium. The catalase activity of the tissues was raised in equal measure by both crown gall [ibid., 12, p. 148; 19, p. 202] and heteroauxin tissues. True tumours and those induced by heteroauxin showed disorganization of cell growth, the frequent occurrence of binuclear cells, and the development of 'nests' of quite irregularly arranged, isolated net tracheids. Tumours on the stems and leaves of *Kalanchoe blossfeldiana* plants inoculated with *B. tumefaciens* [cf. ibid., 28, p. 119] gave rise to roots covered with normal hairs.

Dye (D. W.), Hutchinson (P. B.), & Hastings (A.). **Effect of chemicals and antibiotic substances on crown-gall (Agrobacterium tumefaciens (Smith & Townsend) Conn.). I. Colchicine and penicillin.**—*N.Z. J. Sci. Tech.*, Sect. A, 31, 6, pp. 31–39, 1 fig., 1 graph, 1950. (Issued August, 1951.).

Dye (D. W.) & Hutchinson (P. B.). **Ibid. Part II.**—ibid., 32, 1, pp. 39–43, 1950. (Issued January, 1951.)

In experiments at the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, aqueous solutions of colchicine [*R.A.M.*, 30, p. 21] at 0·5 and 2 per cent. prevented the formation of tumours caused by *Agrobacterium* [*Bacterium*] *tumefaciens* [ibid., 31, pp. 106, 175, and above, p. 319] on French marigold (*Tagetes patula*) and tomato plants under glass and either killed or retarded further development of healthy, growing galls. There was no significant difference between the effects of the two concentrations. Commercial penicillin [ibid., 29, p. 146], however, at water solution concentrations of 15 and 150 Oxford units per ml. neither prevented the formation nor delayed further development of galls on these hosts. Smearing the stem or gall with a lanolin paste containing the colchicine solution was more effective than injecting or brushing on the solution. *B. tumefaciens* was reisolated from *T. patula* plants after all treatments except application of colchicine to growing galls.

In further experiments with various chemicals and antibiotics, acenaphthene [ibid., 21, p. 247; 25, p. 440] applied as a 5 per cent. solution in dioxane, and full strength dioxane alone, both prevented gall formation and significantly retarded the development of growing galls. Where plants were not killed by treatment the bacterium was reisolated from all treated plants.

Zscheile (F. P.). **Nutrient studies with the Wheat bunt fungus, Tilletia caries.**—*Phytopathology*, 41, 12, pp. 1115–1124, 1951.

At the University of California, Davis, the nutritional requirements of *Tilletia caries* (most probably race T–1) [*R.A.M.*, 29, p. 16] were investigated with a view to the development of an improved medium for use in studies on the chemical aspect of the resistance to bunt [ibid., 30, p. 221] of the Baart 38 wheat variety. A concentration of total solutes in the nutritive liquid medium employed (excluding amino acids) of 0·06 M was found to be optimum for transfer cultures. The best growth was made in the presence of 0·0024 M phosphate, 30 p.p.m. calcium, 0·16 p.p.m. manganese, 1·2 p.p.m. zinc, and 1·27 p.p.m. iodide. Sucrose and glucose were satisfactory energy sources. Thiamine at 0·01 p.p.m. was the only vitamin which promoted the growth of the fungus, and it also served to prevent the development of acid conditions in culture media. Optimum pH lay between 6 and 8·6. Pyrimidine was readily synthesized, but not the thiazole portion of the thiamine molecule [ibid., 20, p. 396]. L-asparagine at 0·05 M was the most effective of the amino acids tested singly and in combination as sources of nitrogen. Some of these compounds, e.g., β-alanine, hydroxylamine, and aniline exerted an inhibitory effect on the growth of the fungus.

The originally snow-white colonies tend to harden and assume a grey to brown coloration (preceded by a creamy yellow in the presence of abundant nutrients). Drops of a yellow-brown liquid may be exuded on to the surface of the colony. More nutritive liquid substrata often give rise to colonies with a thick pellicle and very rough, folded shapes. Thiamine, DL-valine, DL-phenylalanine, L-glutamic acid, L-arginine, and the micronutrient elements, especially manganese, stimulated the development from the surface mat in liquid media of long, submerged, segmented mycelial filaments with protoplasm concentrated in a long, straight segment at the lower end.

Numerous cultures were kept under observation for protracted periods in case

chlamydospores might develop [ibid., 4, p. 269]. The type of growth in a four-week-old Richards's solution, diluted 40-fold, suggested incipient chlamydospore formation, and in a four-month-old flask culture on cellulose sponge wetted with a medium containing the optimum mixture of components known to be helpful to development, but with L-arginine as the sole source of nitrogen, chlamydospore-like bodies were definitely identified; a month later the culture liquid, as well as the cellulose sponge surface, was stained with a black pigment and the spores were readily located, occurring at random in masses of mycelial growth. Finally, a few large, dark chlamydospores, with well-sculptured surfaces, were detected in a three-month-old culture on the same medium minus L-glutamic acid but supplied with 0·02 M DL-asparagine.

Minev (K.). **Rasprostranjenje Tilletia spp. na Pšenici u F.N.R.J.** [Geographical distribution of *Tilletia* spp. on Wheat in F.P.R.Y.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 5, pp. 50–53, 1 pl., 1 fig., 1951. [English summary.]

During the examination at the University of Skoplje, Yugoslavia, in 1951 of 208 samples of bunt balls on wheat received from various parts of the country *Tilletia levis* [*T. foetida*: *R.A.M.*, 30, p. 315] was found alone in 134 samples and in conjunction with other species in 22; *T. tritici* [*T. caries*: ibid., 29, p. 609] was alone in 28 and mixed with other species in nine; *T. triticoides* [ibid., 30, p. 432] alone in 14 and mixed in 17; and *T. intermedia* [ibid., 30, p. 315] together with other species in eight. A distribution map for the country is given.

Longchamp (R.), Roy (M.), & Gautheret (R.). **Action de l'ester éthylique du 2-4 D sur le développement de Claviceps purpurea dans les champs de Blé.** [Action of the ethyl ester of 2-4 D on the development of *Claviceps purpurea* in Wheat fields.]—*C. R. Acad. Sci., Paris*, 233, 16, pp. 888–890, 1951.

The application of 2,4-D as a herbicide to ten winter wheat varieties at Rethel, France, in 1950–1 resulted in an epiphytotic of ergot (*Claviceps purpurea*) [*R.A.M.*, 12, p. 275], which was most severe on Rimpau Hybrid, Evolution, and Vilmorin 23. In a plot of 4 sq. m. of the last-named variety there were 15 ears each bearing from one to six sclerotia. There was little difference in the incidence of infection in plots treated with a dosage of 2·5 or 10 kg. per ha., but the fungus developed only after applications in the late growing stage. The climatic conditions of the summer of 1951, especially the humidity, no doubt contributed to the intensity of the outbreak.

Andrews (E.) & Klomparens (W.). **Yellow spot of winter Wheat in Michigan in 1951.**—*Plant Dis. Reptr*, 36, 1, pp. 10–11, 5 figs., 1952. [Multilithed.]

In 1951 winter wheat yellow spot (*Helminthosporium tritici-vulgaris*) [cf. *R.A.M.*, 27, p. 10] caused severe reductions in yield for the first time in Michigan. Heavy infection was present at about the three-leaf stage in a field of Yorkwin wheat in Gratiot County. Spots were predominantly yellow early in the season, but later became dark in the centre and roughly fusiform; yellowish tissue continued as a halo. Sporulation occurred generally on the spots on the withered leaves. Yield from the field was 17 bush. per acre, as compared with 35 in 1950, and the loss was attributed mainly to the disease.

Mosaic is found on Atlas Wheat.—*Seed World*, 68, 11, p. 74, 1951.

Though wheat mosaic virus [*R.A.M.*, 30, p. 25] has been observed on wheat in North Carolina for many years it has not previously attacked the Atlas varieties. However, it is now reported on Atlas 50 and Atlas 60 in the Piedmont area.

Bell (G. H. D.). **Barley breeding and related researches.**—*J. Inst. Brew.*, N.S., 48, 4, pp. 247–260, 1 graph, 1951.

One of the aspects discussed in this paper on barley breeding (presented at a meeting of the London section of the Institute of Brewing on 12th February, 1951) is disease resistance. The apparent increase of loose smut [*Ustilago nuda*] in Great Britain is attributed in part to the importation of certain continental varieties. It is essential that the position should be very carefully watched, and as information becomes available on the reaction of individual varieties it must be communicated to all concerned. At the Plant Breeding Institute, School of Agriculture, Cambridge, the precaution is observed of discarding whole crosses involving the more susceptible continental varieties.

In the course of breeding for resistance to mildew [*Erysiphe graminis*: *R.A.M.*, 30, p. 603] selections have been obtained which have so far shown virtual immunity in the field. Thus, two varieties from Turkey present the unusual combination of winter-hardiness, mildew resistance, and a two-rowed ear. The other resistant forms are of German origin, all being derived from hybridizations involving *Hordeum spontaneum*, mostly from the cross Imperial × *H. spontaneum* back-crossed to such cultivated varieties as Kenia, Isaria, and Carsten's distichous winter.

In 1949 and 1950 the two Turkish mildew-resisters were hybridized with Spratt-Archer and Pioneer, while the two-rowed German forms were crossed with selected cultures from H.B. 34 (Kenia × Spratt-Archer), H.B. 35 (Kenia × Plumage-Archer), and H.B. 40 (Maja × Spratt-Archer), as well as with Pioneer and Plumage-Archer. Furthermore, a German six-row mildew-resister was crossed with three Institute six-row hybrids. The F_1 progeny of the 1949 cross remained uniformly free from the disease in the field in 1950, and some of them were back-crossed to the susceptible, good malting quality parent. All the crosses involving one or two winter-hardy parents were sown in the autumn of 1950 and are now in the F_2. Selection for mildew resistance in winter barley will probably proceed only in the crosses between two winter-hardy parents, while the offspring of crosses between non-hardy parents will be considered for the spring types.

Attention is drawn to the complication introduced into breeding for resistance to *E. graminis* in Germany [loc. cit.] by the tendency of the principal race (A) to segregate into a number of sub-races on winter varieties, so that only semi-resistant winter types could be isolated [ibid., 17, p. 807; 25, p. 31]. This feature, however, was not apparent in the spring varieties, in which group resistance, controlled by the action of a single gene, to all the known sub-races of the fungus could be obtained.

Jacks (H.). **Soil disinfection. X. Preliminary report on control of head smut (Sorosporium reilianum (Kühn) McAlpine) of Maize (Zea mays L.).**—*N.Z. J. Sci. Tech.*, Sect. A, 33, 2, pp. 37–44, 4 figs., 1951.

In this further contribution to the present series [cf. *R.A.M.*, 29, p. 233] the author describes field and glasshouse experiments carried out in New Zealand on maize head smut (*Sorosporium reilianum*) [*Sphacelotheca reiliana*: ibid., 27, p. 116]. When the disease is soil-borne it induces nearly twice as much infection as it does when seed-borne; when it was both seed- and soil-borne incidence was even higher. In the glasshouse complete control was obtained by soil steaming (150° F.) or the application of concentrated chloropicrin or carbon disulphide at 10 and 20 ml., respectively, per cu. ft., as well as by their application and that of formalin in emulsified form (10, 20, and 105 ml., respectively, per gal. of water per cu. ft.). Applied to infected soil in the field chloropicrin, D-D, and iscobromes 1 and 2 [cf. ibid., 29, p. 234] reduced infection but did not give effective control.

Rhind (D.), Waterston (J. M.), & Deighton (F. C.). **Occurrence of Puccinia polysora Underw. in West Africa.**—*Nature, Lond.*, 169, 4302, p. 631, 1952.

Maize rust (*Puccinia sorghi*) [*R.A.M.*, 30, p. 563] has been known in West Africa for many years. In 1949 an epidemic of maize rust occurred in Sierra Leone and in 1950 epidemics occurred in Liberia, Ivory Coast, Gold Coast, Dahomey, and Nigeria, causing serious damage in all these countries, estimated to reach 50 per cent. in some areas. The 1949 collections of maize rust from Sierra Leone, first thought to be *P. sorghi*, and the 1951 collections from the Gold Coast and Nigeria were all found to belong to *P. polysora* [ibid., 30, pp. 142, 309], which has not been previously recorded outside the western hemisphere. The evidence suggests that *P. polysora* reached the Gold Coast not earlier than 1949. The means of its introduction are unknown but it may have been introduced in seed or food from the Americas.

Nicolas (G.) & Aggéry (B[erthe]). **Le charbon du Maïs.** [Maize smut.]—*Bull. mens. Soc. linn. Lyon*, 20, 7, pp. 163–165, 1951.

Observations in France in August 1943 on maize smut [*Ustilago maydis*: *R.A.M.*, 30, p. 607] in both irrigated and non-irrigated soil showed that most of the tumours were present on the stems; on the ears and male flowers they were much less numerous, while the leaves were seldom affected. In irrigated soil the percentage of smutted stools was 5·38, as against 1·07 in non-irrigated [cf. ibid., 15, p. 358]. At the same time in a small field given only light fertilizer treatment and planted with maize for the fourth [successive] year, over 60 per cent. of the stools were covered with tumours.

In July, 1944, a field given an application of phosphatic and nitrogenous fertilizer plus increasing applications (in different plots) of a potassium fertilizer produced only one affected stool.

Mycelium of the fungus was detected at the base of two smutted grains [cf. ibid., 30, p. 152]. Anatomical studies demonstrated that *U. maydis* appears to behave like other species of the genus, but with this difference: chlamydospores are produced only in tissues still in the meristematic state. Exceptionally, infection may take place through wounds, particularly those caused by hail.

Robert (Alice L.) & Findley (W. R.). **Diseased Corn leaves as a source of infection in artificial and natural epidemics of Helminthosporium turcicum.**—*Plant Dis. Reptr*, 36, 1, pp. 9–10, 1952. [Multilithed.]

In work at the Plant Industry Station, Beltsville, Maryland, leaves from field maize heavily infected with *Helminthosporium turcicum* [*R.A.M.*, 31, p. 236] were collected in October, 1950, dried, and stored in an attic until the following spring, when they were used to inoculate a susceptible maize hybrid in the field. Two methods were used: the ground, screened leaves were mixed with water and the inoculum placed in the leaf whorl [cf. ibid., 26, p. 11; 29, p. 19], and large dried pieces were scattered between the rows and round the plants. Both resulted in infection, showing that the mycelium of *H. turcicum* will live over in maize leaf tissue for at least one year after being dried, though the spores do not remain alive. From this mycelium conidia are produced under favourable environmental conditions. The use of dried diseased leaf material for the production of artificial epidemics not only saves laboratory work but may in certain circumstances advance disease development by seven to ten days.

Wisconsin releases two new hybrid Corns.—*Seed World*, 68, 11, pp. 78, 80, 2 figs., 1951.

Two new, early-maturing maize hybrids, W-416AA and W-685, released for

general distribution in Wisconsin, are both highly resistant to stalk rotting diseases [*Diplodia zeae* and *Gibberella zeae*: *R.A.M.*, 31, p. 280]. An earlier selection, W-464A, is also resistant.

Scasso (J. M.). **La defensa de las plantaciones cítricos. Los frutales cítricos considerados del punto de vista sanitario.** [The protection of Citrus plantations. Citrus fruits considered from the sanitary point of view.]—*Alm. Minist. Agric., B. Aires, 1951–52*, pp. 291–301, 5 figs., 1951.

The most destructive citrus disease in the compact, semi-impermeable soils of the Morón district of Buenos Aires, Argentina, is gummosis [*Phytophthora parasitica*, *P. palmivora*, and *P. citrophthora*: *R.A.M.*, 29, p. 208]. After exposure of the stem base and root system [see below, p. 343] and removal of the diseased tissues, the underlying sound portion should be painted with Bordeaux paste (300 gm.–600 gm.–3 l.), applied in three coats with intervals for drying, and left exposed for several weeks before covering with permeable soil (preferably from the surface). In cases of heavy infection the painting should be preceded by a treatment with mercuric chloride 1 in 1,000. When an epiphytotic of the disease is expected as a result of protracted rainfall and excessive soil moisture, the stem base and root-collar should be given a preventive application of 0·25 per cent. Bordeaux mixture (1 kg.–1½ kg.–25 l.).

Vergani (A. R.). **Reconocimiento de la 'lepra explosiva' del Naranjo y del 'tostado' de los frutos cítricos.** [Recognition of 'lepra explosiva' of the Orange and 'toasting' of Citrus fruits.]—*Alm. Minist. Agric., B. Aires, 1951–52*, p. 96, 1 col. pl., 1951.

In Argentina both 'toasting' or 'black orange' of citrus fruits caused by the acarid *Phyllocoptruta oleivorus* and 'lepra explosiva' [leprosis], a severe disease of orange associated with the acarid *Tenuipalpus pseudocuneatus* [*R.A.M.*, 30, p. 104], may be simultaneously combated by two applications of 1 per cent. lime-sulphur (32° Baumé), one in November to December and the other in February to March.

Marsh (P. B.), Guthrie (L. R.), & Butler (M. L.). **The influence of weathering and of microorganisms on the aqueous-extract pH of Cotton fiber.**—*Text. Res. J.*, 21, 8, pp. 565–579, 3 figs., 1 graph, 1951.

Cotton in the field at the Pee Dee Experiment Station, Florence, South Carolina, and the Delta Branch Experiment Station, Stoneville, Mississippi, in the autumn of 1950, following normal boll opening and fluffing of the fibre, developed progressive increases in the pH of aqueous extracts of the fibre from a level in the general range of pH 6·7 to 7·3 to 9·5 to 10, which was sometimes reached within a period of five days. Fibre subjected to wet weather during the process of boll opening developed the unfluffed and darkened appearance characteristic of 'fungus tight lock' and boll rot [*R.A.M.*, 30, p. 104], and its pH values ranged from 5·3 to 9·7. The degree of injury depends upon the period during which it remains in a moist condition, but damage may be so severe that the weakness of the fibre may be apparent when it is broken in the hands. In the case of the common *Diplodia* 'tight-lock' (*D. gossypina*), serious fibre weakening and disintegration were accompanied by pH levels from 5·6 to 6·8.

Pure culture laboratory tests of fibre and unbleached cotton fabric, involving inoculation with 27 isolates and incubation in a humid atmosphere followed by pH determinations, indicated that several species, including *Alternaria* sp., *Cladosporium herbarum*, and *Fusarium moniliforme* [*Gibberella fujikuroi*], commonly found on field-weathered cotton, may bring about very rapid increases in pH of the same general order as those observed in fibre exposed to damp conditions in

nature. For 24 of the isolates tested, both cellulose-decomposing and non-cellulose-decomposing [ibid., 30, pp. 115, 183, 623, *et passim*], the pH changes were upward in direction, the exceptions being *Aspergillus niger* and two strains of *Diplodia*. Once high pH levels were attained, no subsequent decrease occurred during incubation periods of four weeks' duration. On water-saturated cotton fibre mats, certain common bacteria and a common yeast (*Rhodotorula aurea*) induced pH increases. The available data suggest that increases in the aqueous-extract pH of cotton fibre may be caused by the microbial decomposition of malic or other acids in the material.

Fibre that had reached a high aqueous-extract pH during weathering underwent a decline in this value during a storage period of 30 weeks; the higher the original level of the sample, the more rapid was the initial rate of decrease. A fall in pH may also occur while the fibre is still on the plant in the field.

The pH test appears to be of fairly wide applicability as a rapid means of detecting the growth of micro-organisms on cotton fibre. However, the change measured is a response to growth on the non-cellulosic contents of the material and must be supplemented by tests of a different order to determine the presence or absence of structural damage to the fibre.

Tarr (S. A. J.). **Leaf curl disease of Cotton.**—[viii]+55 pp., 12 pl., 1 graph, 1 map, Commonwealth Mycological Institute, Kew, Surrey, 1951. 12*s.* 6*d.*

This concise, comprehensive account of the available information on cotton leaf curl disease [*R.A.M.*, 31, p. 184 *et passim*] comprises 23 chapters dealing, respectively, with cotton cultivation in the Anglo-Egyptian Sudan, an introduction to the disease, geographical distribution, other conditions of cotton described as leaf curl or crinkle, other virus and suspected virus diseases of cotton, virus diseases of Malvaceae, the disease in Nigeria, its origin in the Anglo-Egyptian Sudan, distribution within the Sudan, symptomatology, histopathology, effect on yield, symptomless carriers, transmission, life history of cotton white fly (*Bemisia gossypiperda*), host range of the virus, inter-transmissibility, seasonal carry-over and persistence, factors influencing incidence and spread, control, resistant cottons, nature of resistance, and the causal virus. The list of bibliographical references comprises 113 titles.

Šutić (D. D.). **Otpornost nekih sorata Pamuka prema Bacterium malvacearum E. F. Smith.** [Resistance of certain Cotton varieties to *Bacterium malvacearum* E. F. Smith.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 3–12, 1 pl., 2 figs., 1 graph, 1951. [English summary.]

In tests at the Faculty of Agriculture, Zemun, Yugoslavia, of the resistance of cotton varieties to *Bacterium* [*Xanthomonas*] *malvacearum* [*R.A.M.*, 30, p. 270] plants at the cotyledon stage were found to be most susceptible. Stapp's method [ibid., 7, p. 733; 12, p. 742] gave a reliable estimate of susceptibility after 15 days in the greenhouse. In a field experiment plants were well watered, sprayed the next day with tap water, and immediately needle inoculated with the bacterial culture and then sprayed with a dilution of the culture suspension. For three days, and then at intervals of four or five days, they were sprayed morning and evening with tap water. It appears that in the field unfavourable ecological factors, such as a very high temperature, arrest the development of the bacteria and prevent the spread of infection [cf. ibid., 30, p. 157]. The maximum daily temperature during July and August in 1950, for example, varied from 35° to 40·5° C., whereas the optimum for development of the bacteria is 25° to 30° C. Infection can be reduced or stopped by late sowing in certain regions where complete maturity is possible in the remaining period.

Cruickshank (I. A. M.). **Resistance of linseed and linen Flax varieties to Flax rust (Melampsora lini) in New Zealand. Parts I and II.**—*N.Z. J. Sci. Tech.*, Sect. A, 31, 6, pp. 54–57, 1 fig., 1950 (issued August, 1951); 33, 2, pp. 62–64, 1951.

Imported and locally grown flax and linseed varieties were tested in the Department of Scientific and Industrial Research, Christchurch, for resistance to rust (*Melampsora lini*) [cf. *R.A.M.*, 30, pp. 21, 361; 31, p. 185] by inoculating each one with a mixture of seven collections of uredospores from the chief growing areas of New Zealand. The plants were incubated for 24 hours and then transferred to the greenhouse until the uredosori were ready for counting, 12 to 15 days later. The linseed varieties Sheyenne and Punjab [ibid., 29, p. 354] were rated highly resistant and Golden Viking resistant, the fibre varieties Wada, Cascade, and Argentine II and the Russian selections Stakhanovetz, D–83, and 806/3 all being highly resistant. In later trials, however, Punjab showed high susceptibility to rust collected on Punjab. In Part II it is reported that *Linum monogynum* and *L. marginale* [ibid., 23, p. 474] proved susceptible to *M. lini* collected from flax. *L. monogynum* grows chiefly in rocky places along the coast but also occurs inland, while *L. marginale* is common along roadsides and on other waste land in the vicinity of commercial crops of linseed and linen flax.

Srivastaya (H. C.). **Damping-off in Hollyhocks.**—*Sci. & Cult.*, 17, 2, pp. 91–92, 1 fig., 1951.

During October and November, 1948 and 1949, hollyhock seedlings at the Botanical Garden, Kanpur, India, sustained heavy damage from damping-off. The incidence of infection ranged from 10 to 70 per cent. in 1949. Diseased material plated on potato dextrose agar yielded *Rhizoctonia* [*Corticium*] *solani*, *Sclerotium bataticola* [*Macrophomina phaseoli*], *Pythium debaryanum*, *Alternaria* sp., and *Acrothecium* sp., of which the first three proved to be pathogenic in inoculation experiments in autoclaved soil. All are new records for hollyhock in India. Of the three seed treatments tested for the control of the disease, agrosan G was superior to ceresan or copper oxychloride, while formaldehyde dust (24 gm. per sq. ft.) was the best method of soil sterilization. After dusting, the seed-bed should be covered with oiled paper for a fortnight before sowing.

Nelson (K. S.) & Laurie (A.). **Studies on bacterial wilt of Carnations.**—*Proc. Amer. Soc. hort. Sci.*, 58, pp. 367–370, 1951.

In greenhouse studies at Ohio State University rooted Virginia Miller, Northland, and William Sim carnation plants were cultivated in gravel watered with nutrient solutions in four plots inoculated with *Pseudomonas caryophylli* [*R.A.M.*, 31, p. 227], two being maintained at pH 6 to 6·5 and two at 7 to 7·5, calcium being supplied at the rates of 150 to 200 and 40 to 100 p.p.m. The presence of the disease was determined on a basis of the visual symptoms.

In all treatments the William Sim plants were more susceptible to the wilt than plants of the other varieties. In the low calcium treatments the Virginia Miller plants were more susceptible than Northland, whereas with high calcium the losses in these two varieties were about equal. In all varieties fewer plants died from the disease in the series with high calcium and low pH than in the others, the greatest loss occurring in the one with low calcium and high pH.

Nikolić (V.). **Viroza na Jorgovanu.** [A virus disease of Lilac.] -Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 71–72, 1 fig., 1951. [English summary.]

A virus disease of lilac, similar in its symptomology to that described as ringspot in Bulgaria [*R.A.M.*, 14, p. 462], was observed for the first time in Yugoslavia at Zemun in the summer of 1948, and in 1949 at Zemun and Belgrade.

Viennot-Bourgin (G.). **Oidium begoniae Puttemans, maladie nouvelle pour la France.** [*Oidium begoniae* Puttemans, a new disease for France.]—*Ann. Épiphyt.*, Sér. C, 2, 2, pp. 381–387, 3 figs., 1951. [English summary on separate slip.]

In December, 1950, the author received from a commercial glasshouse at Montluçon (Allier) begonia leaves infected by *Oidium begoniae* [cf. *R.A.M.*, 30, p. 232], not previously recorded in France. Attempts to transmit the disease to varieties and species of *Kalanchoe* [ibid., 25, p. 236], gave negative results, but an *Oxalis repens* plant which happened to be among the others became infected. The pleophagous character of the fungus supports Hammarlund's view that it is similar to *Erysiphe polyphaga* [ibid., 31, p. 148]. The author recapitulates the available information on the disease and the causal organism.

The fungus grew rapidly in a damp, enclosed atmosphere, under poor conditions of lighting, at a temperature of about 15° [C.]. Complete control without appreciable injury to the leaves resulted from an application of 0·2 per cent. copper oxychloride at the end of the autumn.

Gorton (G. R.). **Viruses in Camellias.**—*Camellia Rev.*, 13, 6, pp. 3–4, 1952.

Most of the information in this article has already been noticed from another source [*R.A.M.*, 30, p. 108]. In further studies at the California Institute of Technology a virus causing colour breaking in camellias was apparently transmitted from the variety Monjisu to Colonel Firey.

Ohlander (Margaret C.) & Watson (D. P.). **Experimental storage of cut Peony flowers.**—*Proc. Amer. Soc. hort. Sci.*, 58, pp. 371–376, 1 fig., 1 graph, 1951.

In experiments carried out at Michigan State College, East Lansing, to prolong the storage life of cut peony flowers by improved packing techniques and disease control, fungi isolated from three varieties after storage at 34° to 36° F. in waxed cardboard boxes, heat-sealed in cellophane, were identified as *Fusarium* sp. and *Alternaria humicola* [cf. *R.A.M.*, 28, p. 298]. In tests with six fungicides only paradichlorobenzene at 7·4 gm. per 420 cu. in. of container completely controlled fungal growth on the plants in boxes stored at 35° for over 73 days. Used at 2 or 4 gm. per 420 cu. in. of container it prevented the growth of *A. humicola* in culture, but did not prove lethal. The chemical did not injure the flowers, but it caused severe damage to the foliage, which, however, became objectionable only after 59 days' storage.

Murakishi (H. H.). **Diamond spot, a new disease of Spathoglottis Orchids.**—*Bull. Pacif. Orchid Soc. Hawaii*, 10, 1, pp. 15–16, 1 pl., 1952.

The first visible symptoms of diamond spot, a previously undescribed virus disease of *Spathoglottis* orchids found recently in Manoa Valley, Oahu, Hawaii, are minute chlorotic spots and streaks on young leaves, followed by irregular, reddish-brown to black spots varying from 1 to 4 mm. across, alone or in the form of necrotic rings, or diamond-shaped spots, all on the same leaf or on different ones. On older leaves each diamond spot consists of a central ring encircled by one to five larger concentric, diamond-shaped rings. Premature leaf-casting occurred in severe cases but no colour breaking was observed in the flowers.

In transmission tests typical symptoms appeared in healthy *S. plicata* var. *alba* seedlings five to ten days after sap inoculation from naturally and artificially infected plants. Garden species infected included *S. parsonii*, *S. liliuokalani*, and *S. plicata*. Further work is in progress to determine the host range and relationship of the *Spathoglottis* virus to other orchid viruses.

Waterhouse (W. L.). **Australian rust studies. VIII. Puccinia graminis lolii, an undescribed rust of Lolium spp. and other grasses in Australia.**—*Proc. Linn. Soc. N.S.W.*, 76, 3–4, pp. 57–64, 1951.

Continuing the studies on Australian rusts [cf. *R.A.M.*, 29, p. 150] the author gives a full account of *Puccinia graminis* (ssp. or var.) *lolii* [cf. ibid., 31, p. 278], a hitherto undescribed subspecies which attacks *Lolium* spp., *Dactylis glomerata*, and about 30 other grasses. The aecidiospores resembled those of *P. g.* var. *poae* [ibid., 4, p. 170] in being subspherical but were much larger (12·5 to 23·2 (average 16·9) by 11·6 to 19·3 (16·4) μ). The uredospores resembled most closely those of *P. g.* var. *secalis* [ibid., 26, pp. 290, 292] and were much larger than those of any other grass rust, measuring 22·3 to 31·6 (27·6) by 14·9 to 24·2 (18·08) μ. The teleutospores agreed in general with those of *P. g.* var. *avenae* and were again much larger (32·8 to 63·7 (48·7) by 11·6 to 21·2 (16·9) μ) than those of other grass rusts. Cross-inoculation tests also indicated that *P. g. lolii* must be regarded as different from the other six subspecies of *P. graminis*.

In addition to the occurrence of both resistant and susceptible individuals within certain species of grasses, some strains of *Aegilops ovata*, *Phleum pratense*, *Briza maxima*, and *Poa annua* were hypersensitive to infection, reacting only by small flecks, while in some strains of *B. maxima* and *Phleum pratense* and in all of *B. minor*, *Secale montanum*, *Agrostis gigantica*, *Poa compressa*, *Agropyron scabrum*, and *A. repens* resistance was complete.

The rust is distributed throughout Australia and is present in New Zealand.

Howard (F. L.), Rowell (J. B.), & Keil (H. L.). **Fungus diseases of turf grasses.** —*Bull. R. I. agric. Exp. Sta.* 308, 56 pp., 4 col. pl., 1951.

After an introductory section dealing with progress in turf disease research, resistant varieties, weather in relation to disease outbreaks, and turf fungicides, brief but comprehensive, practical notes are given on the symptoms, geographical distribution, grass hosts, morphology of the causal organism, epidemiology, and control [see next abstracts] of brown patch (*Rhizoctonia* [*Corticium*] *solani*) [*R.A.M.*, 31, pp. 19, 284], dollar spot (*Sclerotinia homoeocarpa*) [ibid., 29, p. 86; 30, p. 615, and next abstracts], pink snow mould (*Calonectria nivalis*) [ibid., 30, p. 324], snow scald (*Typhula idahoensis* and *T. itoana*) [ibid., 30, p. 265], frost scorch (*Sclerotium rhizodes*) [ibid., 12, p. 450; 18, p. 34; 22, p. 482], winter crown rot caused by an unidentified basidiomycete [ibid., 27, p. 526; 31, p. 52], red thread (*Corticium fuciforme*) [ibid., 31, p. 228], copper spot (*Gloeocercospora sorghi*) [ibid., 22, p. 302; 29, p. 86], the blights due to *Helminthosporium vagans* [ibid., 23, p. 11; 30, p. 274; 31, p. 285], *H. giganteum* [ibid., 14, p. 515; 31, p. 124], *H. dictyoides* [ibid., 30, p. 472], *Pyrenophora lolii* [ibid., 28, p. 128], *H. stenacrum*, *H. triseptatum* [ibid., 14, p. 514], *H. erythrospilum* [loc. cit.], *H. cynodontis* [ibid., 19, p. 71; 30, p. 546], and other *H.* species, melting out [ibid., 30, p. 615] due to *Curvularia geniculata* [ibid., 24, p. 221], *C. inaequalis* [ibid., 13, p. 475], and *C. lunata* [ibid., 24, p. 105], the *Pythium* blights caused by *P. aphanidermatum* [ibid., 30, p. 142], *P. arrhenomanes* [ibid., 27, p. 136], *P. debaryanum* [loc. cit.; see also ibid., 28, p. 403; 30, p. 273], *P. ultimum*, and other species, root rot of *Agropyron* spp. due to *Cladochytrium* [*Physoderma*] *graminis* (or ? *C. caespitis*) [ibid., 16, p. 468; 31, p. 285], root scorch due to *Olpidium brassicae* [ibid., 18, p. 821] and *O. agrostidis* [ibid., 12, p. 223], rusts (*Puccinia graminis* var. *agrostis* and var. *poae* [ibid., 31, p. 278 and preceding abstract], *P. coronata* var. *agropyri*, var. *agrostis*, var. *festucae*, and var. *lolii* [ibid., 17, p. 23; 30, p. 274], *P. rubigo-vera* var. *agropyri* [*P. agropyri*], var. *agropyrina*, var. *apocrypta*, and var. *impatientis* [ibid., 30, p. 274; 31, p. 284], and other species), bluegrass (*Poa*) blister smut due to *Entyloma irregulare*, *E. crastophilum*, and *E. bingenensis* [cf. ibid., 7, p. 674], stripe smut (*Ustilago striiformis*) [ibid., 29, pp. 407,

565; 30, p. 472], bunt (*Tilletia pallida*) [ibid., 29, p. 86], and less prevalent smuts, powdery mildew (*Erysiphe graminis*) [ibid., 26, p. 386; 29, p. 101; 31, pp. 124, 284, *et passim*], bluegrass eyespot (*Cercosporella poagena*) [ibid., 22, p. 99], tar spot caused by *Phyllachora graminis* [ibid., 24, p. 251] and by *P. sylvatica* [ibid., 11, p. 722], char spot (*Septogloeum oxysporum*) [ibid., 30, p. 324], the leaf spots due to *Septoria agropyrina*, *S. calamagrostidis* [ibid., 18, p. 297], *S. elymi*, *S. loligena*, *S. macropoda* [cf. ibid., 25, p. 346], *S. nodorum* [cf. ibid., 27, p. 100; 29, p. 410], *S. oudemansii* [ibid., 23, p. 21; 25, p. 157], *S. secalis* var. *stipae*, *S. tenella*, *S. triseti*, and *S. tritici* var. *lolicola* [ibid., 25, p. 346], to *Ascochyta agropyrina*, *A. desmazieri* [ibid., 30, p. 80], *A. elymi*, *A. graminea* [loc. cit.], *A. hordei* [loc. cit.], *A. sorghi* [loc. cit.], and *A. utahensis*, to *Selenophoma donacis* and its varieties [ibid., 28, p. 329], *S. everhartii* [ibid., 24, p. 512], *S. obtusa* [loc. cit.], and *Cercospora festucae* [ibid., 30, p. 274], white heads (*Fusarium poae*) [cf. ibid., 29, p. 451], choke (*Epichloe typhina*) [ibid., 29, p. 249], brown stripe (*Scolecotrichum graminis*) [ibid., 30, p. 324], and anthracnose caused by *Colletotrichum graminicolum* [*C. graminicola*: ibid., 29, p. 609]. A number of minor diseases are also dealt with, and a table is given listing the diseases found on Rhode Island with the time of their occurrence, usual air temperature, fungicides recommended, number of applications, and timing. Host and pathogen indexes and a bibliography of 126 titles are provided.

Butterfield (H. M.), Schoonover (W.), & Shepherd (H. W.). **Lawn planting and care.**—*Circ. Calif. agric. Ext. Serv.* 181, 38 pp., 22 figs., 2 diags., 1951.

In the section of this circular dealing with turf diseases in California (pp. 29–32) notes are given on the symptoms and control of, and factors favouring infection by pre- and post-emergence damping-off caused by *Rhizoctonia* sp., large brown patch (*Corticium solani*) [see preceding abstract], dollar spot (*Sclerotinia homoeocarpa*) [loc. cit. and next abstract], bluegrass (*Poa*) leaf spot (*Helminthosporium vagans*) [loc. cit.], copper spot (*Gloeocercospora sorghi*) [loc. cit.], and fairy rings [*R.A.M.*, 29, p. 85].

Treating grass seed before sowing with 5 oz. tersan, 3 oz. cadminate [see next abstract], or 3 oz. wettable spergon per 1,000 sq. ft. of lawn, and providing good drainage, reduces the danger of damping-off. *H. vagans* may be controlled by phenyl mercurial sprays such as PMAS [ibid., 31, p. 284] and puraturf. Where fairy rings are serious enough to justify control measures magnesium products, such as dolomitic limestone and Epsom salts, should be applied. Rings do not appear in acid soils, in which bent grasses (*Agrostis* spp.) may be grown.

Vaughn (J. R.) & Klomparens (W.). **Comparison of cycloheximide (actidione) with ten other fungicides for the control of turf diseases.**—Abs. in *Phytopathology* 42, 1, p. 22, 1952.

In 1951 actidione [see below, p. 344] was compared with ten other fungicides in a replicated plot of Seaside bent grass [*Agrostis palustris*] at East Lansing, [Michigan]. The area was uniformly inoculated with four turf disease fungi, resulting in heavy infection with *Sclerotinia homoeocarpa* [see preceding abstracts]. Excellent control was secured by spraying with actidione, two chromate compounds (crag 1·025 and crag 531) [*R.A.M.*, 28, p. 295], and an organic cadmium compound (cadminate) [ibid., 29, p. 370]. Spraying with inorganic mercury (calo-clor) [ibid., 31, p. 284] and vancide [ibid., 31, p. 289, and below, p. 365] gave good control, while fairly satisfactory results followed the use of a phenyl mercury compound (tat-c-lect), a mixture of hydroximercurichlorophenol and hydroxymercuricresol (special semesan), and thiram. On large turf plots in another area treatment with actidione eliminated melting out (*Helminthosporium* [*vagans*: see preceding abstracts]).

Cormack (M. W.). **Control of snow mold of forage crops in Alberta.**—Abs. in *Phytopathology*, 42, 1, p. 5, 1952.

All lucerne and clover varieties tested for their reaction to the low-temperature basidiomycete responsible for severe winter crown rot or snow mould in Alberta [*R.A.M.*, 31, p. 52] proved to be susceptible except *Medicago falcata* and Siberian red clover, which are being used in breeding for resistance. Brome grass [*Bromus* sp.] and *Agropyron* spp. were highly resistant and helped in the maintenance of grass and legume mixtures. These grasses and spring-sown cereals or other annual crops could be safely sown following heavy damage, the effective persistence of the pathogen in the soil being limited to a maximum period of two years without a susceptible host. No benefit was derived from the application of fertilizers to the soil, while plants sprayed with a boron solution in the late autumn showed a marked reduction of damage in some experiments but narrowly escaped boron injury. Mercuric chloride was the most promising of the many fungicides tested. Spread of infection was promoted by the presence of uncut plant tops or other refuse.

Allison (J. L.). **Sclerotium rolfsii, a destructive pathogen of Alfalfa and Ladino Clover.**—Abs. in *Phytopathology*, 42, 1, p. 1, 1952.

Lucerne and Ladino clover, recently introduced as perennial forage crops into the south-eastern United States, have been severely attacked by *Sclerotium rolfsii* [*R.A.M.*, 30, p. 447]. Both legumes show the typical symptoms of the disease, which may drastically reduce established stands, especially in hot, damp weather. Single sclerotial isolates from the two hosts were compared on potato dextrose agar with strains of the fungus from *Lespedeza* and soy-bean [loc. cit.]. All the isolates were morphologically similar and formed a profusion of sclerotia in culture, the optimum temperature for their development, as well as for the progress of infection in the uniformly successful cross-inoculation experiments, lying between 25° and 30° C. On the basis of these tests, Ladino clover was rated as very susceptible and the other legumes as susceptible.

Kunkel (L. O.). **Transmission of Alfalfa witches broom to nonleguminous plants by Dodder, and cure in Periwinkle by heat.**—*Phytopathology*, 42, 1, pp. 27–31, 5 figs., 1952.

At the Rockefeller Institute for Medical Research, New York, lucerne witches' broom virus [*R.A.M.*, 31, p. 125] was transmitted by means of dodder, *Cuscuta campestris*, from lucerne to carrot, tomato, and *Vinca rosea*, but not to its own host or parsley. It was conveyed by grafting from lucerne to lucerne, tomato to tomato, tomato to potato, potato to potato, and *V. rosea* to *V. rosea*. *Macrosteles divisus* failed to transmit the virus from diseased carrots to healthy carrots or China asters.

A comparison of the symptoms of lucerne and potato witches' brooms [ibid., 23, p. 39] in tomato, potato, and *V. rosea* plants indicated that the two diseases are quite distinct. It was further concluded from a study of lucerne witches' broom symptoms in the above-mentioned and carrot plants that the disease is unlike any of the other well-known viruses of the yellows type.

V. rosea plants were not cured of lucerne witches' broom by up to 35 days' exposure to a temperature of 30° C., but they recovered after 25 days at 32·5° or 35°, 10 at 40°, and seven at 42°. However, 16 months after recovery they proved to be susceptible to reinfection by grafting.

Chilton (J. E.). **A species of Volutella parasitic on Alfalfa.**—Abs. in *Phytopathology*, 42, 1, p. 5, 1952.

An apparently undescribed species of *Volutella* [cf. *R.A.M.*, 8, p. 290], first detected on accessions in the Primary Plant Introduction greenhouse at Ames,

Iowa, invades the cortex of lucerne petioles both inter- and intracellularly, killing the entire leaf. The occasional linear lesions on the stem are brown at first, turning grey later. The pink to white, erumpent sporodochia, 50 to 80 by 40 to 70 μ, are furnished with sparse, brown, continuous to triseptate, marginal setae, 60 to 110 by 4 to 6 μ. The hyaline, mostly navicular, often biguttulate conidia, 5·2 to 10 (mean 7·5) by 2 to 3·5 μ, are borne on simple conidiophores. Among the isolates from field plants was a variant producing conidia identical with the foregoing but having less prominent though more densely setose sporodochia. Both forms produce an appressed, pink mycelial mat on artificial media, with scattered sporodochia. The former type, more common in the field, has been found on lucerne, *Medicago falcata*, and red and alsike clover. Lucerne plants at the Nebraska Agricultural Experiment Station, grown from the same seed lots as were planted at Ames, were also attacked by the fungus.

Brooks (R. M.) & Olmo (H. P.). **Register of new fruit and nut varieties.** -*Proc. Amer. Soc. hort. Sci.*, 58, pp. 386–407, 1951.

In this annotated list of new fruit and nut varieties it is stated that the Wright apple is somewhat resistant to blight [? *Erwinia amylovora*] and less susceptible to scab [*Venturia inaequalis*] than Jonathan. The Ebony King blackberry is resistant to orange rust [*Gymnoconia interstitialis*: *R.A.M.*, 31, p. 24], Northstar cherry to leaf spot [*Coccomyces hiemalis*: cf. ibid., 27, p. 175; 31, p. 69], Tait-Dropmore and Texking pears to fireblight [*E. amylovora*: cf. ibid., 30, pp. 15, 404], and Raribank plum to brown rot [*Sclerotinia fructicola* and *S. laxa*: cf. ibid., 22, p. 439; 23, p. 492; 24, p. 23].

Allen (F. W.). **Apple growing in California.**—*Circ. Calif. agric. Ext. Serv.* 178, 75 pp., 3 col. pl., 32 figs., 1 diag., 1 graph, 1 map, 1951.

This circular replaces *Bulletin* 425 of the same title, published in 1927. Sections V and VIII deal, respectively, with the chief field and storage diseases of apples in California, the appropriate control measures being indicated. Development of soft scald [*R.A.M.*, 30, p. 169; 31, p. 242], which is rarely serious on well matured fruit stored at 30° to 32° F., has been prevented by placing the fruit in an atmosphere of 25 per cent. carbon dioxide for 24 hours before storing at 30° to 32°. If there is delay in getting the fruit to a low temperature preliminary treatment at 36° is recommended because ripening is almost twice as rapid at this temperature and susceptibility is reduced. Oiled wraps are ineffective against soft scald. Jonathan spot [ibid., 24, p. 139] is often prevalent in storage.

Panjan (M.). **Određivanje roka prskanja protiv krastavosti (Fuzikladija) Jubuke.** [Determination of the time for spraying against Apple scab (*Fusicladium*).] - Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 31–40, 1 diag., 1951. [English summary.]

In trials at the Institute for Plant Protection, Zagreb, Yugoslavia, from 1946 to 1948, to determine the best date for spraying apple trees against apple scab (*Venturia* [*inaequalis*: *R.A.M.*, 31, p. 126 and next abstract]) spraying immediately after the discharge of ascospores under laboratory conditions was found to be most suitable, for if rain occurred the spores were discharged in the field also a few days later. When examined on 1st March perithecia were found to be at different stages of development each year [cf. ibid., 18, p. 531] and, therefore, the mean daily temperature aggregates from that date to ascospore discharge were not likely to be the same for each year as suggested by Holz [cf. ibid., 22, p. 391]. Temperature considered alone appeared to be of no value. In 1946, 1947, and 1948 the date when the ascospores were ripe coincided each year with the appearance of the first green leaflets.

Mirić (Mirjana). Служба предвиђања рокова прскања воћака против чађаве краставости и могућност успостављања те службе код нас. [Spray warning service against scab disease of fruit trees and the possibility of establishing that service in our country.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 5, pp. 54–66, 1951. [English summary.]

Two trials with the purpose of establishing a forecasting service for apple spraying against *Venturia inaequalis* [see preceding abstract], carried out at the College of Agriculture Estate near Beograd and at Užička Požega, Yugoslavia, in 1950, showed that a well-timed application can prevent early and late infections. Bordeaux mixture (1 per cent.) or duphar (a mercury preparation obtained from Holland, at 0·15 per cent.) was applied before flowering on 1st April on the Kolačara, Tetovka, Malinovka, and Kanadka varieties and on 11th April on Zlatna Parmenka, Rebrača, Kulonova, and Jonathan. Second and third post-blossom sprays (duphar at 0·1 per cent.) followed simultaneously on all varieties on 27th April and 10th May. Since fruit production was very poor infection estimates were taken from the leaves. Satisfactory results were obtained for all the varieties, while the untreated trees, with the exception of Kanadka, Kulonova, and Zlatna Parmenka, were severely infected. In the second trial Zlatna Parmenka, Delicious, Jonathan, Winesap, London Pippin, and Budimka sprayed with 1 per cent. Bordeaux mixture on 17th April and 10th May developed leaf infections varying from 0 to 5 per cent. and fruit scab from 0 to 3 per cent.; control of leaf infection on Kolačara was not satisfactory (15 to 30 per cent.) and the trees were given an additional spray. In spite of drought most of the untreated trees were heavily infected.

Louw (A. J.). **Studies of the influence of environmental factors on the overwintering and epiphytology of Apple scab (Venturia inaequalis (Cke) Wint.) in the winter-rainfall area of the Cape Province.**—*Sci. Bull. Dep. Agric. S. Afr.* 310, 48 pp., 2 pl., 8 graphs, 1951. [Afrikaans summary.]

Laboratory and field studies at the Western Province Fruit Research Station, Stellenbosch, South Africa, on primary infections by *Venturia inaequalis* [*R.A.M.*, 30, p. 275] in the winter-rainfall area of the Cape showed that stromata on overwintered leaves and fruits did not produce conidia the following spring; those found occasionally on twigs did not survive the winter and neither stromata nor viable conidia were observed on bud scales. Wetting of the leaves by dew provided sufficient moisture for the development of perithecia. Using slide traps it was found that in the orchard, though ascospores were discharged only during rain, conidia were disseminated also during periods of misty weather and heavy dews. In heavy rain fewer conidia are left on the susceptible parts of the host.

Harriss (R. W.). **Mainly on Apple scab.**—*Fruit-Grower*, *1952*, 2941, pp. 865–866, 1952.

The author quotes examples from his experience which show that the most important factor in the control of apple scab [*Venturia inaequalis*] is good soil drainage [cf. *R.A.M.*, 19, p. 354; 27, p. 138], followed by free air circulation, largely through pruning, and then keeping the soil in a state of balance to ensure hard, healthy wood.

Jauch (Clotilde). **Antracnosis del Peral y del Manzano.** [Anthracnose of Pear and Apple trees.]—*Alm. Minist. Agric., B. Aires, 1951–52*, p. 384, 2 col. figs., 1951.

The symptoms of apple and pear anthracnose (*Elsinoe piri*) in Argentina [*R.A.M.*, 19, p. 366], the geographical distribution of the disease, and the morphology of the causal organism are briefly described. Control may be effected by the collection

and burning of diseased material and prophylactic treatment with 0·75 per cent. Bordeaux mixture.

Murneek (E. A.). **Thiolutin as a possible inhibitor of fire blight.**—*Phytopathology*, 42, 1, p. 57, 1952.

Fireblight (*Erwinia amylovora*) of apple and related species [*R.A.M.*, 31, p. 242] having proved refractory to control by several fungicides in Missouri, tests were performed on the susceptible Jonathan variety on 5th May, 1951 (when approximately 90 per cent. of the flowers were open) with thiolutin (isolated from *Streptomyces albus*) and streptomycin [ibid., 31, p. 276], both applied in aqueous solution with a power sprayer, the former at the rate of 19 and the latter at 10 gm. per 100 gals. On 6th July the average numbers of infections on the trees treated with thiolutin and streptomycin were 48 and 94, respectively, compared with 224 on the unsprayed. Thiolutin appears to be active against many organisms.

Klindić (O.) & Milatović (I.). **Krastavost japanske Mušmule.** [Scab of Japanese Medlar.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 5, pp. 39–43, 3 figs., 1951. [English summary.]

Specimens of loquat from the island of Korčula, Southern Dalmatia, Yugoslavia, were severely infected by *Fusicladium dendriticum* var. *eriobotryae* [*R.A.M.*, 26, p. 533] in 1950. The disease, which is believed to have been introduced from Italy [ibid., 25, p. 493], has probably been spreading in the country for a considerable time; it was also observed in 1950 on the island of Lussin in the Northern Adriatic and near Dubrovnik.

Nikolić (V.). **Nove viroze koštičavog voća u F.N.R.J.** [New virus diseases of stone fruits in the F.P.R.Y.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 63–70, 4 figs., 1951. [English summary.]

In addition to the virus diseases already described on stone fruits in Yugoslavia [*R.A.M.*, 27, p. 27], mosaic was observed on apricots [ibid., 18, pp. 189, 699] and peaches [loc. cit.] in Belgrade, on peaches in the Trstenik district, and on cherries [loc. cit.] near Kragujevae in 1947 and 1948. Control measures are described.

Wade (G. C.). **Progress report of brown rot of Apricot investigations.**—*Tasm. J. Agric.*, 22, 3, pp. 258–266, 2 figs., 1951.

In further studies on the control of brown rot of apricots (*Sclerotinia fructicola*) [*R.A.M.*, 28, p. 406; 30, p. 47] at the Tasmanian Department of Agriculture, inoculation tests in 1949–50 and 1950–1 showed that a fall in the resistance of the fruits to pressure, measured with a penetrometer, coincided with increase in susceptibility. The change in ground colour from green to yellow green was a useful indication of susceptibility but less reliable than penetrometer readings. Infection was present in apparently sound fruit, although no obvious symptoms were noted on the trees until a week before harvesting. Thiotox (1½ lb. per 100 gals.) as a cover spray applied three weeks before picking reduced brown rot on the Moorpark variety in 1950–1 to 9·6 per cent. compared with 21·5 for the untreated; when followed a week before picking by isothan Q15 (1 in 500) or thiotox, 12·1 and 10 per cent. infection, respectively, developed in storage, compared with 35·3 for the untreated. The later sprays are of value in reducing the disease in storage but not on the tree. Thiotox leaves no objectionable residue and has no adverse effect on the canned product. Shirlan AG also gives control but the residue may be toxic; for this reason and because of tree injury all other fungicides tested have been rejected. Orchard hygiene should be observed even when cover sprays are used.

Chamberlain (E. E.), Atkinson (J. D.), & Hunter (J. A.). **Plum-mosaic, a virus disease of Plums, Peaches and Apricots in New Zealand.**—*N.Z. J. Sci. Tech.*, Sect. A, 33, 2, pp. 1–16, 7 figs., 1951.

Plum mosaic of virus origin, first observed in New Zealand [*R.A.M.*, 30, p. 20] in 1946, is now found throughout the Dominion, occurring naturally on a number of European plum and greengage varieties, Japanese plum (*Prunus salicina*) varieties, *P. cerasifera*, damson, peach, apricot, and *P. mahaleb*. It was transmitted by budding to nectarine seedlings, Monavale almond, sour cherry stock, and *P. cerasifera* var. *pissardii*.

The disease produces a wide range of symptoms, which are tabulated, on different varieties and species and even on the same variety. Leaf symptoms consist of yellow to creamy-white veinbanding, chlorotic lines sometimes forming oak-leaf patterns, chlorotic spotting, interveinal chlorosis, and mosaic mottling. When present in *P. cerasifera* stocks the disease appears to have an adverse effect on the survival of the buds of some plum and apricot varieties inserted in them. The virus appears to be similar in symptom and host range, and bud-transmission to the peach line-pattern virosis virus of Shiro plums in Ontario [ibid., 25, p. 218] and to Cation's description of the symptoms for this virus [ibid., 21, p. 146], and it is also similar to the Californian Santa Rosa virus [ibid., 19, p. 417]. The use of healthy propagating material only is suggested. The thermal death point of the virus in *P. cerasifera* cuttings is at least as high as the death point of the plant tissue.

Hansen (C. J.). **Prune production in California.**—*Circ. Calif. agric. Ext. Serv.* 180, 35 pp., 1 pl., 29 figs., 1 map [? 1951].

In section III by E. E. Wilson notes are given on the symptoms, cause, and control of the principal parasitic and non-parasitic diseases affecting prune plums in California.

Martinović (M.). Заштита Шљива од рогача. [Protection of Plum trees from pocket plum.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 8, 33–38, 1 pl., 1951. [English summary.]

From 1947 to 1951 experiments were conducted in several plum-growing regions of Yugoslavia for the control of pocket plum (*Taphrina pruni*) [*R.A.M.*, 27, p. 26], which was extremely destructive in 1948, is very widespread in the country, and threatens the economically important Požegača variety. Heavy rains during the flowering period are favourable to the disease. Excellent control was obtained by spraying the trees, from crown to base, three to four weeks before flowering with either 1 to 2 per cent. Bordeaux mixture or lime-sulphur (26° Baumé [ibid., 30, p. 599] diluted 1:10). Similar results were obtained with ammonium dinitro-cresolate which also destroyed all lichen and moss on the trees.

Cation (D.). **Further studies on transmission of ringspot and Cherry yellows viruses through seeds.**—Abs. in *Phytopathology*, 42, 1, p. 4, 1952.

Continuing his studies [at the Michigan Agricultural Experiment Station: *R.A.M.*, 28, p. 339; 30, p. 329] on seed transmission of ring spot and cherry yellows viruses [ibid., 30, p. 477; 31, p. 129], the writer germinated and grew to seedling stage in the greenhouse seeds collected from two [*Prunus*] *mahaleb* trees infected by yellows which were subsequently indexed on peach in the field. The seedlings from one tree showed 41 per cent. total virus transmission and those from the other 24. In each series the ratio of yellows to ring spot was 2:1. The index figures for a commercial source of *P. mahaleb* seedlings were 11 per cent. virus infection and a 1:2 yellows to ring spot ratio. Montmorency seedlings from a tree with cherry yellows showed 46 per cent. infection and a ratio of 1:2, while 56 per cent. ring

spot developed on seedlings arising from a Mazzard tree harbouring the same virus. Some *P. mahaleb* buds were apparently virus-free, but infection was more uniformly distributed through those of the Mazzards. In a comparative test cherry trees propagated from disease-free buds on a commercial source of Mazzard stock exhibited 20 per cent. yellows symptoms in the field, while the corresponding percentage for trees propagated on commercial *P. mahaleb* was 1·24.

Fulton (R. H.). **Studies on Verticillium wilt of Raspberry.**—Abs. in *Phytopathology*, 42, 1, p. 8, 1952.

Single conidial isolates of *Verticillium* [*albo-atrum*] from raspberry [*R.A.M.*, 30, 332] yielded four biotypes [cf. ibid., 31, p. 69], of which three were used in inoculation experiments. S1 (micro-sclerotial) and S2 (fluffy mycelium) infected raspberry at 24° C., while S3 (appressed mycelium) gave positive results at 28°. Cane or root injuries accelerated the development of infection. Suckering was reduced in red raspberries attacked by the pathogen. The toxin theory seemed to afford the most plausible explanation of wilting. Filtrates from three of the biotypes did not become toxic until the fungi had been grown for at least 30 days in synthetic broth and exposed to continuous light. On the other hand, the filtrate of S1 cultures grown in the dark became toxic following 30 hours' exposure to light. After ultrafiltration the non-filterable portion induced a wilt without vascular discoloration, while the filtrate blackened the vessels without causing wilt. Hence it is concluded that the toxin may be a complex of several compounds varying in particle size. Biotype S2 gave two optimum growth reactions to pH, at 5·5 and 8. The biotypes made acid media more alkaline, approximating to their requirements for optimum growth.

Perišić (M. M.). **Didymella applanata (Niessl) Sacc.**—Проузроковач сушења грана и ставала Малине — Једна нова болест Малина код нас. [*Didymella applanata* (Niessl) Sacc.—the cause of drying of Raspberry branches and stems—a new Raspberry disease in our country.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 8, pp. 18–21, 1 pl., 2 figs., 1951. [French summary.]

Didymella applanata [*R.A.M.*, 29, p. 248; C.M.I. map No. 72] is reported for the first time on raspberries in Yugoslavia. Over 60 per cent. of the canes were affected in three different localities in Serbia in 1949, 1950, and 1951, which suggests that the disease is not of recent introduction.

Plakidas (A. G.). **Chlorotic phyllody of Strawberry.**—*Plant Dis. Reptr*, 35, 11, pp. 495–496, 1 fig., 1951. [Multilithed.]

Symptoms of a new, at present unidentified disease, first observed affecting a small number of strawberry plants in Louisiana in 1949 and again in 1950, are chlorosis of the foliage varying from light green to brilliant yellow and phyllody of the flowers, followed by stunting and death of the plants with the advent of warm weather. According to experiments made at the Louisiana Agricultural Experiment Station, Baton Rouge, some of the runners seem able to outgrow the disease.

Schwartze (C. D.) & Myhre (A. S.). **Results of grafting Northwest and Marshall Strawberry plants to a virus indicator.**—*Proc. Amer. Soc. hort. Sci.*, 58, pp. 80–90, 5 figs., 1951.

In studies at the Western Washington Experiment Station, Puyallup, strawberry plants were indexed in an insect-free greenhouse by runner-grafting to a Californian species resembling *Fragaria vesca* susceptible to virus [yellow edge and crinkle: *R.A.M.*, 31, p. 131]. Twenty-six vigorous specimens of the hybrid Northwest and 12 of Wash. 203, all symptomless, though previously exposed to virus

infection, induced marked degeneration in the indicators. Similar effects followed when the indicator species was grafted to Marshall plants showing typical yellow edge [ibid., 30, p. 619].

When groups of symptomless, certified Marshall plants from three different sources were indicator-grafted, all the indicators for two lots developed symptoms, though of a milder kind than those of yellow edge; two symptom types, differing mainly in severity, consistently appeared in paired samples. Of four non-certified Marshall plants only one developed symptoms resembling those reported for yellow edge, but less severe than the virulent forms of the disease.

It is concluded that Northwest and Wash. 203 are symptomless carriers of viruses. Evidence that mild viruses are present in some certified Marshall stocks is of serious importance, as these viruses may be components of a more serious complex.

Nicolini (J. C.). **La podredumbre de las raíces del Olivo.** [Root rot of Olive.]—*Alm. Minist. Agric., B. Aires, 1951–52*, pp. 319–320, 1 col. pl., 1951.

The symptomatology and etiology of olive root rot (*Rosellinia necatrix*) [*R.A.M.*, 20, p. 504; 25, p. 508], widespread in Argentina, are described and instructions given for its control in plantations by cultural methods, including the eradication and burning of diseased trees, which should be surrounded by a trench 40 to 50 cm. in depth and varying in diameter with the age of the tree. Italian workers have found that the roots extend horizontally for a distance two or three times the height of the tree. The soil within this radius may be disinfected with quicklime (½ kg. per sq. m.) or other chemicals, e.g., uspulun-universal at 0·25 per mille, using 5 l. per sq. m., sodium arsenite at 2 per mille (10 l. per sq. m.), and sulphur dust at a dosage of ½ kg. per sq. m. The chemical treatment of contaminated soils is very costly and would not be profitable except where only a few trees are involved.

Zentmyer (G. A.) & Richards (S. J.). **Pathogenicity of Phytophthora cinnamomi to Avocado trees, and the effect of irrigation on disease development.**—*Phytopathology*, 42, 1, pp. 35–37, 1 fig., 1952.

The pathogenicity of *Phytophthora cinnamomi* to avocado [*R.A.M.*, 31, p. 289 and next abstract], already demonstrated under favourable environmental conditions [ibid., 22, p. 319], was confirmed by experiments in a field planting of five-year-old budded trees at the University of California, Los Angeles. The influence of irrigation practices on the development of the root rot was clearly apparent, the disease appearing sooner and causing more rapid damage on trees in infested soil irrigated weekly than on those given bi-weekly treatments. No ill effects attended frequent irrigation in non-infested soil. The fungus was found to have moved at least 15 ft. uphill from the time of soil infestation in January, 1949, until the sampling in October, 1950, most likely by mycelial growth through the moist soil and along the roots.

Zentmyer (G. A.). **A substance stimulating sexual reproduction in Phytophthora cinnamomi.**—Abs. in *Phytopathology*, 42, 1, p. 24, 1952.

A water-soluble chemical substance in the feeder roots of Mexican avocado stimulates sexual reproduction in *Phytophthora cinnamomi* [*R.A.M.*, 30, p. 278, and preceding abstract]. In numerous tests oogonia and antheridia developed in profusion two to three days after inoculation of the aqueous extract (pH 6·5) with the fungus. The stimulatory substance is not a protein, withstands autoclaving at 15 lb. for 20 minutes and one hour's boiling at 99° C., is dialysable, removable from the aqueous extract by chloroform, and adsorbed on norit. Both antheridia and oogonia were produced in single zoospore cultures. Oospores were formed in the

avocado extract by isolates from *Camellia*, chestnut, *Cinchona*, heather [*Erica*], pine, pineapple, *Rhododendron*, and six isolates from avocado from different countries [cf. ibid., 29, p. 235; 31, p. 152]. Comparable root extracts from chestnut, heather, and pine did not incite oospore production. The extract also stimulated sexual reproduction in one strain of *P. drechsleri* [ibid., 30, p. 433; 31, p. 206 and below, p. 351], but not in *P. capsici*, *P. cambivora*, *P. citrophthora*, *P. cryptogea*, *P. palmivora*, or *P. parasitica*.

Campacci (C. A.). **Ocorrência de Phytophthora parasitica Dast., em Mamoeiro.** [Occurrence of *Phytophthora parasitica* Dast. on Papaw.]—*Biológico*, 17, 8, pp. 142–143, 1 fig., 1951.

Papaws in three localities of São Paulo, Brazil, have been attacked by *Phytophthora parasitica* [*R.A.M.*, 21, p. 382; 27, p. 483, *et passim*], a new host record for the country. The fungus girdles the stems, resulting in premature defoliation, but has not so far been observed to invade the leaves and fruits in nature, though the former contracted infection in inoculation tests. Preventive measures should include the selection of seed from healthy trees and its treatment with a copper or organic mercury fungicide before planting; sparing use of manure and choice of exposed, well-aerated, and fairly dry sites; and spraying with Bordeaux mixture or dusting with sulphur, the former at 0·5 per cent. in the nursery and 1 per cent. in the orchard. Cure of the disease in two-year-old trees has been effected by excision of the necrotic tissue and application of Bordeaux paste to the exposed healthy area.

Bird (J.) & Adsuar (J.). **On the viral nature of Papaya bunchy top.**—Abs. in *Phytophthology*, 42, 1, p. 3, 1952.

The evidence hitherto available for the virus origin of papaw bunchy top [in Puerto Rico: *R.A.M.*, 28, p. 131] was inconclusive. Penetration of the tissues by the infective agent is shortly followed by failure of latex flow. The virus spreads downwards very slowly, and affected plants can be cured by cutting back the stem immediately below the site of invasion. The causal entity was shown by a series of graft transmissions to be capable of reproduction within the host. A single individual of the leafhopper *Empoasca papayae*, associated with the transmission of the disease, was able to transmit the virus. Healthy plants fed upon for one day by *E. papayae* developed bunchy top symptoms six weeks later.

Symposium on fungicides.—*Contr. Boyce Thompson Inst.*, 16, 7, pp. 295–386, 3 graphs, 3 diags., 1951.

To this symposium of papers presented at a meeting of the American Chemical Society, 12th April, 1950, of which a summary has already been noted from another source [*R.A.M.*, 29, p. 629], R. H. Wellman contributes (pp. 295–298) an account of the economics of using fungicides in agriculture, in which he states that fungous diseases of plants cost each person in the United States about $10 per month (equivalent to an annual total of $1,750,000,000), in spite of the control methods now practised. If no fungicides were available the crop loss would rise to over $4,000,000,000 a year. The sales of fungicides that have come into the market in the last ten years amount to 8,000,000 of the $34,000,000 spent on fungicides each year.

J. G. Horsfall and S. Rich (pp. 313–347) present data on the relation of structure and activity of heterocyclic nitrogen compounds to fungitoxicity (with 34 references), based on assay by the spore germination technique of some 165 heterocyclic nitrogen compounds, using *Sclerotinia fructicola* and *Stemphylium sarciniforme* [ibid., 31, p. 193] as test fungi. All compounds were dissolved in a solvent and 0·2 ml. pipetted to the cylindrical depression in a glass slide. The solvent was

allowed to evaporate and the depression filled with 0·4 ml. of standard spore suspension (50,000 spores per ml. of re-distilled water). The spores were incubated overnight at 25° C. and next morning the percentage not germinating was recorded. The only unsubstituted nitrogen heterocycles showing activity were pyrrole, indole, hydroquinoline (three saturation levels), phenazine, and acridine. Three tetrahydro-iso-quinoline-phenanthrene compounds were fungitoxic to both organisms, though isoquinoline was not. The combined addition of a hydrocarbon and an amino, nitroso, nitro, hydroxyl, or sulphydryl polar group to an inactive nucleus was sometimes more effective in inducing toxicity than the addition of either alone. It is suggested that hydrocarbon substituents probably confer lipoid solubility on the molecule and that the polar groups increase its chemical reactivity. Chlorination did not add fungitoxicity to these nuclei, and occasionally reduced it.

R. H. Gruenhagen, P. A. Wolf, & E. E. Dunn (pp. 349–356, nine references), dealing with some phenolic fungicides (phenol, halophenols, alkyl and aryl phenols, and esters and salts of phenols) [see next abstract], adduce examples showing that phenols are versatile and adaptable antimicrobial agents. Each of the products 4-*sec*-butylphenol, 2, 4, 5-trichlorophenol, and *o*-phenylphenol inhibits *Saccharomyces cerevisiae*, *Aspergillus niger* [ibid., 31, p. 136], *Chaetomium globosum* [loc. cit.], *Penicillium digitatum*, *Phomopsis* [*Diaporthe*] *citri* [ibid., 31, p. 27], and *Rhizopus nigricans* [*R. stolonifer*]. The chlorinated phenols used as pea and groundnut seed protectants against the soil-inhabiting fungi *Pythium*, *Rhizoctonia*, and *Fusarium* gave varying degrees of control; fungicidal activity was a property of dichlorophenol, increased to a peak with trichlorophenol [cf. ibid., 26, p. 573], and occurred with tetrachlorophenol though emergence was reduced. A similar, though more uniform, progression was obtained when the compounds were tested as fungistats against *Rhizopus stolonifer*. The antimicrobial uses of phenols are tabulated. *O*-phenylphenol has a combination of characteristics (low toxicity, medium persistence, and bactericidal effectiveness over a wide pH range) which render it suitable for wide application, including the food industry.

Dealing with the fungitoxicity and biological activity of quinones [ibid., 31, p. 223] G. L. McNew and H. P. Burchfield (pp. 357–374, 84 references) state that with the test tube dilution technique [ibid., 26, p. 497] for measuring inhibition of germination of spores of *Alternaria oleracea* [*A. brassicicola*] and *Sclerotinia fructicola* [ibid., 30, p. 380] tetrachloro-*p*-benzoquinone (spergon) [ibid., 31, p. 290] was shown to have an ED 50 value between 0·01 and 0·1 p.p.m., and an ED 95 of about 400 p.p.m. in tests against *A. solani* on tomato foliage; the 2,5- and 2,6-dichloro-*p*-benzoquinones were only slightly less effective. Tetrabromo-*p*-benzoquinone was almost as toxic as spergon in glass slide tests but less effective on tomato foliage. Quinone compounds, fungitoxic to plant parasites, generally have an adverse effect on yeasts and bacteria. Anthraquinone, benzoquinone, phenanthraquinone, and naphthoquinone are listed in the order of increasing potency, but substituents on the nuclei may affect their activity so that the classes overlap. Halogenation generally improves fungitoxicity, decreases phytotoxicity, and renders the materials less soluble. Fungitoxicity and bacteriostasis are usually correlated with extent of halogenation, chlorine being more and iodine less effective then bromine in any series of analogues. Hydroxyl and methoxyl groups ortho to the carbonyl groups usually increase solubility and phytotoxicity to higher plants, while the substitution of an alkyl group ortho to the carbonyl group generally reduces fungitoxicity. The combination of two alkyl groups, an alkyl and a hydroxyl, or an alkyloxy group between two carbonyl groups para to each other destroys most of the activity against fungi and bacteria and the effect on enzyme systems. Such combinations where separated as in the 3,5-positions of a benzoquinone or removed from position ortho to the carbonyl groups as in 5,8-dihydroxy-1,4-naphthoquinone or its 2-methyl derivative do not destroy activity. In general,

p-quinone compounds are only moderately, if at all, more active than their ortho analogues.

F. R. Whaley and J. B. Harry (pp. 375–386, 10 references) describe the development of some interesting fungicides from the general class of chromate complexes [ibid., 29, p. 370 *et passim*], including a calcium cadmium-copper-zinc chromate 531 particularly effective against dollar spot [*Sclerotinia homoeocarpa*: see above, p. 331] on bent grasses [*Agrostis* spp.].

Kirby (A. H. M.). **Plant protective chemistry.**—*Rep. E. Malling Res. Sta., 1950*, pp. 44–47, 1951.

A new technique, employing rolls of filter paper held by stainless steel rings, has been developed for the culture of *Venturia* spp. [cf. *R.A.M.*, 31, p. 50]. Rapid growth and sporulation are obtained and nutritional studies in liquid media facilitated. Marked differences were found between *V. inaequalis* and *V. pirina*, particularly in the nitrogen sources they utilized.

In laboratory tests the germination of *V. inaequalis* spores was inhibited at 0·1 per cent. by w-nitro-styrene, 1,1-dibromo-2, 2-di-iodoethylene, and tetra iodoethylene [ibid., 29, p. 38]. The commercial lauryl ester of pentachlorophenol [ibid., 28, p. 574] gave LD50 values comparable with the free phenol [see preceding abstract], whereas the pure ester failed to prevent full germination even at 25 times the concentration. Clearly the free-phenol content cannot explain such a difference in activity. SR406 [ibid., 31, p. 67] completely inhibited spore germination at 0·0016 per cent.; 4-nitroso-1-*p*-sulphamylphenyl-3,5-dimethylpyrazole (36L) [ibid., 31, p. 264] gave almost total inhibition at 0·04 per cent. *Botrytis allii* spores were completely inhibited by SR406 at 0·0035 per cent.

A series of standard and promising materials were applied to Cox's Orange Pippin on M. IX apple trees in two pre-blossom and one post-blossom (petal fall) sprays, using *V. inaequalis* [ibid., 30, p. 233; 31, p. 290] as the test organism. As in 1949 ziram gave the cleanest fruit, followed by phenyl mercury chloride, ferbam, J49 [ibid., 31, p. 189], and copper cuprosulphite. SR406, thiram, Z 78, glyoxalidine 341C, and dispersible sulphur were all of lower, though considerable, activity. Slight leaf damage followed applications of phenyl mercury chloride, ziram, ferbam, and SR406. In June there was least scab on leaves receiving copper cuprosulphite, J49, phenyl mercury chloride, and SR406. Dispersible sulphur (73 per cent. sulphur) applied at 0·8 per cent. pre-blossom and 0·4 per cent. post-blossom held its own with lime-sulphur (applied at 2·5, 2, and 1 per cent. in the three sprays, respectively), the total sulphur being slightly higher in the dispersible form. Again, glyoxalidine 341C was rather less efficient this year and phenyl mercury chloride at 0·05 per cent. active ingredient was the least effective.

Wilson (J. D.). **Field testing of fungicides for vegetable disease control.**—*Phytopathology*, 41, 12, pp. 1050–1058, 1951.

The several considerations involved in planning an experiment on the field testing of fungicides are discussed under the headings of site, crop and variety, planting plans, equipment, formulation, application schedules, preliminary data, yield and supplemental data, statistical treatment, and publication.

It is important to choose a site with a soil type inherently suited to the growth of the crop to be tested and more or less uniform over the whole area. Good soil drainage is essential and provision should further be made for some flow of air across the field. At least average fertility should be maintained, with no marked excesses or deficiencies of nutritional elements. It is often advisable, moreover, to place the sites far enough apart to afford a comparison of fungicidal performance on plants grown under widely varying soil and climatic conditions. The test crop

variety susceptible to the disease under test should be chosen. Some well-known examples of this kind of specificity are given.

It should be so arranged that all replicates can be treated with fungicides in one round trip. Using these methods, 40 different treatments may be applied to six replicates in an eight-hour day, reckoning a movement of the equipment not exceeding two miles an hour. Some general requirements for sprayers and dusters are indicated and directions for their application given. The manufacturers' formulations for fungicides may contain either too little or too much wetting agent, and therefore be difficult to maintain in a suitable and uniform suspension. The joint application of a fungicide and an insecticide entails the intimate mixture of the two types of material in the sprayer tank or duster hopper, either prior to the time of treatment, as in many dust formulations, or just as the spray (tank mix) or dust mixture is being prepared.

The date of the first application will depend partly on the need to make the most efficient and economical use of the fungicide. Some diseases, e.g., early blight of tomato (*Alternaria* [*solani*]), are seldom troublesome until a certain ratio between fruit load and leaf area has been established, while the first treatment against tomato anthracnose (*Colletotrichum* [*phomoides*: *R.A.M.*, 28, p. 599]) may await the appearance of the first fruits. The last application should generally precede harvesting by a week or two. New growth should be covered as often as practicable.

The whole experimental area should be inspected at least once a week and the location of the first infection points recorded as they appear on the differently treated plots. When the untreated plots are judged to have lost a minimum of 25 per cent. of their effective foliage area through disease the corresponding condition for all plots should be estimated and recorded [ibid., 21, p. 354; 30, p. 527]. Further estimates should be made at weekly intervals until most of the plots are defoliated.

Weight or volume determinations or numerical counts of yield at a single harvest or successive ones, treated statistically, usually afford the most reliable basis for judging the performance of a fungicide in respect of both disease control efficiency and phytotoxicity.

Some general advice as to the publication of the experimental data is given.

Wenzl (H.). **Die Anwendung statistischer Prüfverfahren in Pflanzenschutzversuchen.** [The application of statistical methods of assay in plant protection experiments.]—*Z. PflKrankh.*, 59, 1–2, pp. 26–38, 1 graph, 1952.

Starting from the assumption that statistical methods of appraisal in plant protection experiments [see preceding abstract] are often incorrectly applied, the author discusses the premises for the use of the analysis of variance and 't' tests, together with the existing possibilities for the provision of such assumptions by appropriate transformations. In this connexion attention is drawn to the application to the 't' test of Cochran and Cox's approximation procedure (cf. Snedecor, G. W. Statistical methods applied to experiments in agriculture and biology, 4th edition, Iowa State College Press, Ames, Iowa, 1946) for the correct statistical appraisal of experimental data.

Biedermann (W.) & Müller (E.). **Die Inaktivierung des gelösten Kupfers (II) in Fungiziden.** [The inactivation of dissolved copper (II) in fungicides.]—*Phytopath. Z.*, 18, 3, pp. 307–338, 8 graphs, 1951. [English summary.]

Using spores of *Alternaria tenuis* [*R.A.M.*, 29, p. 420], the authors demonstrated by a comparison of LD50 values that the fungicidal activity of cupric compounds is derived from their free cupric ions, complex-bound copper being non-toxic. Copper is inactivated by the complex-forming acids, malic, tartaric, and ethylendiaminetetra-acetic, and by glycocoll and asparagine. A second type of inactivation is due to ion antagonism, the cations sodium, calcium, potassium, and hydrogen occupying

the spore surface and preventing copper absorption. Both vine leaf excretions and the juice of grapes contain such complex-forming substances and cations capable of inactivating copper. A tannin detected in the juice, and a substance, probably a tannin, in the leaf excretions inhibited spore germination.

Specialpræparater til bekæmpelse af plantesygdomme og skadedyr anerkendte af Statens Forsøgsvirksomhed. Gyldig for året 1951. [Special preparations for the control of plant diseases and pests approved by the State Experimental Service. Valid for the year 1951.]—*Tidsskr. Planteavl*, 54, 4, pp. 705–722, 1951.

Analyses are furnished of a number of fungicides and insecticides authorized by the Danish Plant Protection Service for use in 1951 [cf. *R.A.M.*, 29, p. 221].

Spraying and dusting.—*Seed Trade Buyers' Guide*, 35, pp. 226, 228, 230, 1952.

This is a list of commercial insecticides and fungicides which have proved effective in controlling or eradicating the more common pests and diseases attacking growing crops in the United States, arranged alphabetically under the host and parasite [cf. *R.A.M.*, **31**, p. 289]. A list of these materials arranged alphabetically under their manufacturers is given on p. 232.

Fernandez Valiela (M. V.). **Introducción a la fitopatología. Segunda edición.** [Introduction to phytopathology. Second edition.]—xxiv+872 pp., 1 pl., 165 figs., 11 diags., 2 plans, Talleres Graficos 'Gadola', Buenos Aires, 1952.

This extensively amplified revision of the author's treatise [*R.A.M.*, 24, p. 28] has been produced with the aid of a number of experts in the field of plant pathology, and comprises, *inter alia*, sections on the breeding of disease-resistant varieties (pp. 57–63), methods for the estimation of losses (pp. 67–78), and the incorporation of new data in the chapter (VII) on fungicides (pp. 779–819). All parts of the text and the bibliography have been brought up to date.

Marchionatto (J. B.). **Influencia de las prácticas culturales en las enfermedades de las plantas.** [Influence of cultural practices on plant diseases.]—*Alm. Minist. Agric., B. Aires, 1951–52*, pp. 86–87, 1951.

Many diseases of economic plants in Argentina are materially influenced by cultural practices. Foot rot or gummosis of orange [*Phytophthora parasitica*, *P. palmivora*, and *P. citrophthora*: *R.A.M.*, 29, p. 208 and above, p. 336], until recently one of the most serious citrus diseases in the country, thrives in damp ground. Exposure of the main roots at the stem base and removal of diseased tissues is a very effective control measure which should be adopted in all plantations of sweet orange raised from seed or grafted on free stocks. It is recommended, therefore, that in new plantings of sweet orange grafted on the same stock or on others susceptible to foot rot but resistant to tristeza root rot [ibid., 31, p. 181], the trees should be planted on mounds of soil 20 to 30 cm. in height and 80 to 100 cm. in diameter, so that when they settle the base will be quite uncovered at soil-level.

Foot rot [unspecified] of wheat may be combated by rotation with maize or oats, but not with rye or barley, which are also susceptible to the disease.

Wheat or maize may be grown alternately with flax for the control of flax wilt *Fusarium lini* [ibid., 30, p. 319].

Losses from potato blight (*Phytophthora* [*infestans*: ibid., 30, p. 537]) are heavy wherever tomatoes occur in the rotation; they should be replaced by non-susceptible crops, such as chick peas [*Cicer arietinum*] or other legumes.

The development of chilli wilt [? *Fusarium vasinfectum*: ibid., 20, p. 235] is favoured by cultivation on narrow ridges, which permit of direct contact between

the contaminated irrigation water and the plants, whereas with broad ones (1·2 m. in width) the spores of the fungus are immobilized in the soil before the water reaches the plants.

The drastic reductions in pea yield due to foot rot [*Mycosphaerella pinodes* and *Ascochyta pinodella*: ibid., 21, p. 185] may be averted by early sowing during the winter and spring.

Rotation of tobacco with legumes or other non-susceptible crops is an effective means of preventing infection by tobacco mosaic, 'corcovo' [tomato spotted wilt], and 'polvillo' [fine dust] viruses [ibid., 26, pp. 174, 525], none of which is seed-borne.

FLENTJE (N. T.) & JEFFERY (MARGARET W.). **A note on some slime moulds from South Australia.**—*J. Dep. Agric. S. Aust.*, 55, 6, pp. 297–300, 4 figs., 1952.

During 1951 reports were received from several districts in South Australia of the occurrence of myxomycetes on the surface of pasture grasses, field crops, and lawns, and on garden plants. Some of those identified were *Physarum* sp. [*R.A.M.*, 23, p. 347] common on pasture grasses and lucerne, a less common *P.* sp. observed on buffalo grass [*Buchloe dactyloides*] lawns, *Diachea leucopoda* on strawberry plants, and *Badhamia* sp. on clover.

Spraying with Bordeaux mixture has been reported to be an effective method of control.

WORST (J.). **A micro-injection needle.**—*Nature, Lond.*, 169, 4302, pp. 631–632, 2 figs., 1952.

The microscopical, glass-forging method was used for preparing a micro-injection needle by drawing out a glass capillary tube in which a lateral hole had been blown. When the extremely narrowed tube breaks, half the elongated hole is severed, the remaining half becoming terminal. This gives a chisel-like extremity with an orifice down to a few μ in diameter.

GOTTLIEB (D.). **The disappearance of antibiotics from soil.**—Abs. in *Phytopathology*, 42, 1, p. 9, 1952.

The role of antibiotics in the mutual antagonism of soil micro-organisms is governed by the measure of their persistence in the soil [*R.A.M.*, 30, p. 139]. Chloromycetin [chloramphenicol: ibid., 30, p. 597 and next abstract], for instance, is stable in sterile soil but rapidly inactivated in non-sterile. At the high concentrations of 50 μgm. per gm. soil an initial 24-hour lag was followed by a rapid decline to 43 and 15 per cent. after 72 hours and a fortnight, respectively. The degradation is fairly complete, no inactive aryl nitro compounds or aryl amines having been detected in the soil. Clavacin [ibid., 29, p. 596] was also shown to undergo rapid inactivation by the soil microflora; at 48 hours it could not be demonstrated in concentrations above the sensitivity of the assay. In the sterile control soils, on the other hand, the concentration of clavacin was undiminished even after seven days. Within 11 days' incubation 92 per cent. of the initial actidione [ibid., 30, pp. 408, 615 and above, p. 331] content had disappeared from non-sterile and 53 per cent. from sterile soil. Basic antibiotics like streptomycin [ibid., 30, p. 383; 31, p. 196] and streptothricin [ibid., 29, pp. 146, 271] are inactivated by the clay, the organic matter, and the microbial population of the soil.

CARDELLE (G.). **Antibióticos y botánica.** [Antibiotics and botany.]—*Rev. Soc. cub. Bot.*, 8, 4, pp. 59–71, 5 figs., 1951.

The author, with the aid of the relevant literature, describes the general methods by which over 200 antibiotic substances have been discovered and tested [*R.A.M.*,

31, pp. 253, 319], tabulates the most important of these together with the organism of origin, and gives notes on the preparation and therapeutic properties of penicillin [ibid., 30, pp. 184, 597], streptomycin [ibid., 30, p. 281 and preceding abstract], chloromycetin [chloramphenicol: loc. cit.], aureomycin [ibid., 31, p. 175], and terramycin [ibid., **30**, p. 281].

Crawford (Kathleen), Heatley (N. G.), Boyd (Pamela F.), Hale (C. W.), Kelly (B. K.), Miller (G. A.), & Smith (Nancy). **Antibiotic production by a species of Cephalosporium.**—*J. gen. Microbiol.*, 6, 1–2, pp. 47–59, 1 pl., 1 graph, 1952.

Studies on the anti-bacterial activity of a strain of *Cephalosporium* sp. [cf. *R.A.M.*, 31, p. 82] isolated from the sea near a sewage outfall off Sardinia showed it to be due to a number of antibiotics, one group of which, cephalosporins P, is soluble in organic solvents and active only against Gram-positive bacteria.

Christensen (C. M.) & Cohen (M.). **Numbers, kind, and source of molds in flour.** *Cereal Chem.*, 27, 2, pp. 178–185, 1950.

The mould counts of some 500 samples of wheat flour [*R.A.M.*, 28, p. 187], collected mostly in commercial mills in Idaho, Utah, Colorado, Kansas, Missouri, Minnesota, South Dakota, Oregon, and New York, ranged from several hundred to over 5,000 per gm. The predominant species were *Aspergillus glaucus* [ibid., 31, p. 112] and *A. candidus* [loc. cit.], while *Penicillium* sp. [loc. cit.] and *A. flavus* [loc. cit.] were prevalent in occasional samples and others yielded small numbers of *A. ochraceus*, *A. niger*, *A. versicolor*, *A. terreus*, *Rhizopus nigricans* [*R. stolonifer*], *Mucor racemosus*, *Hormodendrum* sp., *Alternaria tenuis*, *Helminthosporium* sp., and *Fusarium* sp. [loc. cit.]. Three samples of washed wheat from one mill, collected on the way to the first break rolls, contained only a few hundred moulds per gm., but the flours milled from this material harboured up to several thousand per gm. Several thousand to several million moulds per gm. of the species commonly encountered in commercial flours were present in samples from the interior of spouts, roll housings, and other mill machinery, and the chief source of fungal contamination would appear, therefore, to reside within the milling system itself. *Aspergillus glaucus*, *A. candidus*, and *P.* sp. were among the species remaining viable in two samples after two to three years' storage.

Pehrson (S. O.). **Preservation of sodium carboxymethylcellulose from microbiological degradation.**—*Svensk PappTidn.*, 53, 22, pp. 726–732, 1950. [German and Swedish summaries.]

Among the moulds isolated from sodium carboxymethylcellulose solutions at the Swedish Forest Products Research Laboratory, Stockholm, were *Verticillium cinnabarinum* [*Nectria inventa*: *R.A.M.*, 28, p. 490; 31, p. 198], *Penicillium cyclopium* [ibid., 30, p. 577], *P. notatum*, *P. fumiculorum*, *Aspergillus versicolor*, and *A. sydowi* [loc. cit.]. Directions are given for the preservation of the solutions from these contaminants by the admixture of phenyl mercuric acetate [see next abstract] at a dosage of 1 to 10 mg. per l., sodium pentachlorophenolate at 100 to 200 mg., or the sodium salt of dioxy-dichloro-diphenylmethane at 100 mg.

Pehrson (S. O.). **Erfarenheter under år 1950 från användningen av organiska kvicksilverföreningar mot svampskador i slipmassa.** [Observations in the year 1950 on the application of organic mercury compounds against fungal damage in wet groundwood pulp.]—*Svensk PappTidn.*, 54, pp. 401–407, 4 figs., 1951. [English summary.]

Much of the information presented in this account of the observations made during 1950 on the treatment of wet groundwood pulp against fungal damage in

Swedish and Norwegian mills with phenyl mercurials, especially phenyl mercuric acetate, has already been noticed [*R.A.M.*, 30, pp. 337, 427; 31, p. 155, and preceding abstract]. The degree of protection thus obtained, though not absolute, is sufficient for commercial purposes. *Penicillium conditeanum* is mentioned as an associate of *P. roqueforti* in the production of purple spots in the bales.

Brien (R. M.) & Reid (W. D.). **An investigation on control of mould fungi on cork inserts of crown tops.**—*N.Z. J. Sci. Tech.*, Sect. B, 33, 5, pp. 393–397, 1 fig., 1952.

Following serious losses to manufacturers, studies at the Department of Scientific and Industrial Research, Auckland, New Zealand, showed mould growth on composition, gelatin-bordered cork disks, used inside metal bottle caps, to be due mainly to *Aspergillus* [*R.A.M.*, 28, p. 187] and *Penicillium* [loc. cit.] species and to a lesser degree to *Trichoderma viride* [loc. cit.], *Rhizopus nigricans* [*R. stolonifer*: ibid., 6, p. 392], and *Cladosporium herbarum* [loc. cit.]. Complete control of moulding was obtained with 50 per cent. micronized thiram and with spergon, both at an application rate of 1 per cent. dust by weight, while cetavlon (80 per cent. cetyltrimethylammonium bromide), yellow cuprocide, 50 per cent. micronized salicylanilide [ibid., 28, p. 187], and 50 per cent. thiram seed dust, all at 1 per cent., reduced it considerably. Only thiram and salicylanilide proved suitable for commercial use as they left no marked colour or odour, the former particularly being more effective because the 15 per cent. dust gave a complete control at 1 per cent. application and the 50 per cent. at 0·25 per cent., these results being confirmed in factory tests.

Leonard (J. M.) & Pitman (A. L.). **Tropical performance of fungicidal coatings. A statistical analysis.**—*Industr. Engng Chem.*, 43, 10, pp. 2338–2341, 1 fig., 1951.

In connexion with studies at the Naval Research Laboratory, Washington, D.C., on the protection of military electronic equipment from moisture and fungal damage [*R.A.M.*, 31, p. 136], the toxicity to [unspecified] moulds of 100 chemical compounds at 1, 5, and 10 per cent. dispersed in varnish or lacquer, was investigated by the exposure for six months of coated cotton-braid wires in a hut in the Panama jungle, where the relative humidity was usually above 90 per cent. and the temperature ranged from 74° to 86° F. Monthly inspections showed most of the materials, including many of the chlorinated phenols, to be ineffectual. Among the most nearly satisfactory, listed in a roughly descending order of efficiency, were *o*-hydroxyphenylmercuric chloride, salicylanilide [ibid., 31, p. 29], pyridylmercuric chloride, *p*-toluene sulphonylamide, uranyl nitrate, *p*-aminophenylmercuric acetate, phenylmercuric-*o*-benzoic sulphimide, *p*-acetylaminophenylmercuric acetate, hydroxymercurisalicylic acid anhydride, and phenylmercuric phthalate.

From a statistical analysis of the observations on these compounds it is concluded that mould growth is significantly influenced by each of the primary variables (vehicle, fungicide, concentration, and time). The varnish vehicle (phenolic tung oil) was more resistant to infection than the lacquer (alkyd resin-modified nitrocellulose). The choice of an individual toxicant (from among the best ten) is of less importance than that of a vehicle. Concentration, however, was the most significant of the variables, retardation of mould growth being directly proportional to the amount of the fungicide used. For instance, the highly toxic organic mercurials, commonly employed at levels of 1 or 2 per cent., were seldom effective below 5 per cent. in these investigations, while even 10 per cent. was frequently inadequate. Relatively brief exposures were found to yield useful results.

Winter (A. G.) & Willeke (Lisel). **Untersuchungen über Antibiotika aus höheren Pflanzen. II. Mitteilung.** [Studies on antibiotics from higher plants. Note II.] —*Naturwissenschaften*, 38, 15, p. 354, 1 graph, 1951.

Examples are cited of the changes in the bacterial population of soil samples effected by the addition to peptone agar cultures of the expressed juice of *Aucuba japonica* in various dilutions [*R.A.M.*, 31, p. 134].

Krstić (M.). О ефемерном инхибиторном дејству једног спорогеног бацила према мицелијуму **Lenzites quercina.** [Concerning the transitory inhibitory activity of a sporogenous bacillus to the mycelium of *Lenzites quercina*.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 5, pp. 13–17, 3 pl., 1951. [French summary.]

A description is given of the inhibitory activity *in vitro* of a sporogenous, slimy, unidentified bacillus against a strain of *Lenzites* [*Daedalea*] *quercina* [*R.A.M.*, 29, p. 340] isolated from an oak stump in Croatia, Yugoslavia. On approaching the bacillus colonies on an agar plate the growth of the fungus was arrested for 24 hours; it then began to grow again round the colonies, isolating them and leaving an inhibition zone 3·5 to 4 mm. wide. After several days of inactivity the mycelium continued to grow very slowly towards the bacillus colonies, but failed to reach them. In another experiment in which oak and beech sawdust, steeped for several days in a culture filtrate of the bacillus, was deposited on solid cultures of *D. quercina* and *Coriolus* [*Polystictus*] *versicolor* [ibid., 29, p. 237], respectively, the growth of the fungi on the wood was prevented.

Levisohn (Ida). **Forking in Pine roots.**—*Nature, Lond.*, 169, 4304, p. 715, 1 fig., 1952.

In experiments carried out at Bedford College, London, the bases of pots containing Scots pine seedlings were fitted into the necks of earthenware jars so that the roots formed a root system in the leaching water below. Irrespective of the kind of potting soil used this root system developed a rich forking of the short roots when the seedlings in the pots had formed mycorrhiza, whereas no forking was present if the roots in the pots had no mycorrhizal associations. Forking thus appeared to be induced by exudates of the mycorrhizal fungi washed from the potting soil into the containers [cf. *R.A.M.*, 29, p. 44]. In some experiments in which plants with intracellular (haustorial) infection were used, the container roots were forked and had infection of the haustorial type.

Johnson (R. L.). **The in vitro effect of various forms and concentrations of nitrogen on the morphology of Verticillium albo-atrum R. & B.**—Abs. in *Proc. Ind. Acad. Sci.*, 60, pp. 78–79, 1950. [Received May, 1952.]

Studies at Purdue University, Lafayette, Indiana, have shown the growth *in vitro* of *Verticillium albo-atrum* [*R.A.M.*, 26, p. 554; 30, p. 367] to be influenced by the use of peptone, urea, ammonia, nitrate, and nitrite at equivalent nitrogen contents. Colony growths ranged from a white floccose pellicle to a black carbonaceous type and from floating to submerged. To avoid the development of misleading morphological characteristics extreme caution in the selection of a cultural medium, which should be standardized, is necessary before positive identification is attempted.

Rönnebeck (W.). **Zur Frage der chemischen Bekämpfung der grünen Pfirsichblattlaus (Myzodes persicae Sulzer) als Virusüberträger im Kartoffelfeld.** [On the question of the chemical control of the green Peach Aphid (*Myzodes persicae* Sulzer) as a virus vector in the Potato field.]—*Z. PflBau PflSch.*, 1 (45), 3, pp. 119–132, 4 graphs, 1950.

In the hot, dry summer of 1947 when potato viruses in the Cologne district of

Germany were disseminated by winged *Myzodes* [*Myzus*] *persicae* [*R.A.M.*, 30, p. 241 and next abstracts] the spread of infection assumed a sporadic form, whereas in the rainy season of 1948 [ibid., 29, p. 274], when the wingless forms were responsible, the fluctuating type predominated. The widespread contamination of healthy stands in 1947 entirely precluded the possibility of controlling potato virus Y by means of insecticidal treatments with E 605 at 0·01 and 0·02 per cent. [loc. cit. and cf. ibid., 31, p. 201], and only a limited reduction in leaf roll incidence was effected. The disappointing results are attributed to the insufficient tenacity of the insecticide, the tendency of the alatae to colonize the treated rather than the untreated areas aggravating the position. In 1948 the outcome of the trials with E 605 was much more satisfactory as regards leaf roll, over 50 per cent. reduction in the incidence of the disease being achieved in the Erdgold, Sabina, Ackersegen, Voran, and Bona varieties. When the insecticidal treatment was supplemented by early harvesting (20th July) the percentage of leaf roll in Sabina, Ackersegen, and Bona was reduced from 51, 66, and 45 to 15, 14, and 9, respectively. Virus Y, introduced into the stands exclusively by winged aphids, again proved refractory to this method of control.

The prospects for the chemical control of viruliferous aphids are considered to be more hopeful as an accessory measure of field hygiene in the elevated situations set aside for seed production, where the sporadic form of virus spread is of minor importance, than in typical 'degeneration' areas like the Rhine Province.

RÖNNEBECK (W.). **Über die Frühjahrsentwicklung der grünen Pfirsichblattlaus (Myzodes persicae Sulzer) am Primärwirt im Hinblick auf ihre Bedeutung als Virusüberträger im Kartoffelfeld.** [On the spring development of the green Peach Aphid (*Myzodes persicae* Sulzer) on the primary host with respect to its importance as a virus vector in the Potato field.]—*Z. PflKrankh.*, 57, 9–10, pp. 351–357, 3 graphs, 1950.

It is concluded from the results of observations at Bonn, Germany, in 1949 and 1950 on the spring development of *Myzodes* [*Myzus*] *persicae* on peach trees and other hosts that the efficacy of insecticidal treatments for the control of potato virus vectors [see preceding and next abstracts] depends on their commencement at the time of the main flight of the migrants, coinciding for practical purposes with the period between the earing and flowering of rye, i.e., the second week in May to the beginning of June in the two years covered by the experiments; the mere suppression of mass reproduction from mid-June to the end of July is inadequate. Paranicrol (a yellow oil) at a strength of 4 per cent. is recommended for the complete destruction of the winter eggs; other preparations require to be supplemented by treatment with a contact insecticide, such as strong E 605 used at 0·035 per cent.

RÖNNEBECK (W.). **Weitere Beiträge zur Bekämpfung von Myzodes persicae Sulzer als Virusüberträger im Kartoffelfeld.** [Further contributions to the control of *Myzodes persicae* Sulzer as a virus vector in the Potato field.]—*Z. PflKrankh.*, 59, 1–2, pp. 13–26, 2 graphs, 1952. [English summary.]

The author summarizes and discusses the results obtained by independent research parties in Schleswig-Holstein, Germany, in investigations during the spring of 1951 on the phenology of winter rye ear development in relation to the inception of the main flight of migrants of the potato virus vector, *Myzodes* [*Myzus*] *persicae* [see preceding abstracts]. There was no difference in principle, as regards the spring development of the aphid on peach, between the local conditions and those described from the United States (*Bull. Maine agric. Exp. Sta.* 470, 1949).

The importance of the primary host, peach, on the one hand, and of the group of winter greens constituting the secondary hosts on the other, as a factor in the

intensity of the flight to potatoes is demonstrated by reference to the years 1949 and 1950. From a calculation of the number of winged forms in a field of seed Savoy cabbage covering an area of 2,400 sq. m. it is concluded that this source of infestation is of no importance except for potato crops in the immediate vicinity. Decisive for the colonization of potatoes is the time and intensity of the flight from peach trees. Experiments have shown that even a slight infestation (10 aphids per 100 leaves) by *M. persicae* may result in the infection of one potato plant from each neighbouring one with secondary leaf roll virus. Since the period for 'seed' selection overlaps for about a fortnight with that of vector infestation in German 'seed'-producing regions, the occurrence of virus infection at this time may more or less cancel the effect of roguing unless the aphids are exterminated, preferably by means of two applications of systox (Bayer 8169) at a minimum dosage of 0·5 l. per ha.

Panjan (M.). **Virusne bolesti Krumpira u N. R. Hrvatskoj.** [Potato virus diseases in P. R. Croatia.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 49–55, 1951. [English summary.]

Potato virus X [*R.A.M.*, 17, p. 619] is reported as a newly recorded virus on potato in Croatia, Yugoslavia.

Delević (B.). Прилог проучавању осетљивости Кромпира према пламењачи. [Contribution to the testing of the susceptibility of Potatoes to blight.]—Заштита Биља [*Plant Prot. Beograd*], *1951*, 8, pp. 3–17, 2 pl., 1951. [English summary.]

Phytophthora infestans, which is very common on potatoes throughout Serbia [C.M.I. map No. 109; *R.A.M.*, 30, p. 537], causes a regular 10 to 20 and sometimes up to 80 per cent. loss in crop yield. For estimating the degree of leaf resistance at the Institute for Agricultural Research, Kragvjevac, Yugoslavia, a modification of the Schick and Lehmann method [ibid., 15, p. 600] was used, with five grades, i.e., immune (O), fairly resistant (s), medium (sS), fairly susceptible (Ss), and susceptible (S). Of the varieties tested for selection only the domestic Švabovac and selections Iz V and Iz 1/9 showed a satisfactory resistance of both leaves (grade s) and tubers.

Mills (W. R.) & Peterson (L. C.). **The development of races of Phytophthora infestans (Mont.) de Bary on Potato hybrids.**—Abs. in *Phytopathology*, 42, 1, p. 26, 1952.

Three distinct genes for immunity from potato blight (*Phytophthora infestans*), designated B, C, and D, were identified [? at the Pennsylvania Agricultural Experiment Station] among the progeny of hybrids between *Solanum demissum* and *S. tuberosum* [*R.A.M.*, 28, p. 483; cf. ibid., 31, p. 254]. As the plants approach maturity, the dominant reaction of immunity gives way to a high degree of resistance. Serial passages of the common field race A through senescent foliage of such plants result in the development of new, virulent, highly stable races of the fungus, specific for the gene or genes carried by the host. Race B, for instance, is formed by the passage of race A through plants carrying gene B. Eight different combinations of the three plant genes being possible, eight races of *P. infestans* were postulated, including A, virulent for the completely recessive form only. Five of the seven races anticipated on this basis were repeatedly developed in the laboratory and isolated from breeding plots, but negative results were given by all attempts to induce the formation of the remaining two (CD and BCD) or to isolate them from the field. Furthermore, plants of genetic constitutions CD and BCD have remained free from infection. Failure to discover or produce races combining virulence factors C and D suggests that these genes are allelomorphic.

KEYWORTH (W. G.). **Verticillium wilt of Potatoes in Connecticut 1951.**—*Plant Dis. Reptr*, 36, 1, pp. 16–17, 1952. [Multilithed.]

During recent years potatoes in many fields in Connecticut have wilted prematurely. Isolation and re-inoculation tests showed the wilt to be due in all cases to *Verticillium albo-atrum* [cf. *R.A.M.*, 26, p. 209; 27, p. 119]. Moderately severe symptoms were noted on Katahdin and Green Mountain, but the most severely affected variety was Kennebec. A survey was made of 23 widely dispersed potato fields; 18 yielded *V. dahliae*, while four gave *V. albo-atrum*. Five intermediate strains, obtained from occasional plants, formed both the dark mycelium of the latter species and microsclerotia of the former and so could not be classified on their cultural characters [see above, p. 347]. Typical isolates from each group were all found to be infective.

The only control measures at present applicable locally are the avoidance of highly susceptible varieties for planting in ground known to be infected, the use of wilt-free 'seed' for planting new ground, and crop rotation.

MARTINS (A. O.). **A desinfecção de Batatas-sementes.** [Seed Potato disinfection.]—*Biológico*, 17, 8, pp. 135–139, 1951.

All seed potatoes imported into Brazil (which is almost entirely dependent on foreign sources of supply) must be certified free from infection by *Synchytrium endobioticum* and *Spongospora subterranea* [*R.A.M.*, 15, p. 64], but other diseases of minor importance may be combated by fungicidal treatment of the tubers, e.g., with mercuric chloride or semesan bel. In this connexion the principles and practice of seed potato disinfection are discussed, with special reference to local conditions in São Paulo.

ROSE (R. E.) & BAILEY (R. W.). **Ethylene oxide for soil sterilization.**—*Nature, Lond.*, 169, 4304, p. 716, 1952.

A rapid method for sterilizing soil with ethylene oxide [cf. *R.A.M.*, 28, p. 82] devised in studies at the Rukuhia Soil Research Station, Hamilton, New Zealand, consists in making up an aqueous solution to supply 2 or 4 ml. of ethylene oxide in a given amount of water, using chilled glassware and water. The soil is then watered with the solution and covered. The amount of water required is found by trial beforehand and depends on the initial moisture content of the soil.

In tests replicated five times the fungal flora was reduced from 230,000 per 10 gm. untreated soil to 0 by 100 ml. 4 per cent. ethylene oxide watered on to chilled soil kept subsequently in a refrigerator for 12 hours, and by 100 ml. 2 per cent. on soil at room temperature, this result being equivalent to that obtained by electric sterilization for three hours (maximum temperature 95° C.), compared with 13,000 after autoclaving (15 lb. for 20 minutes). The corresponding reductions of actinomycete numbers (in millions) were from 4·7 (control) to 0·2, 0·2, 0, and 0·03; and of bacteria (millions) from 4·3 to 0·1, 0·3, 0, and 0.

KEYWORTH (W. G.) & HARRIS (R. V.). **Diseases of the Hop—work at East Malling Research Station.**—*Nature, Lond.*, 169, 4303, pp. 644–645, 1952.

An outline is given of the history and present knowledge of systemic diseases of hops investigated at East Malling, namely *Verticillium* wilt [*V. albo-atrum*: *R.A.M.*, 29, p. 120] (with particular reference to breeding for resistance) and the virus diseases mosaic [ibid., 27, p. 295], nettlehead [ibid., 28, p. 309], and split leaf blotch [ibid., 31, p. 84]. The importance of propagating healthy planting stock is emphasized.

Luck (J. V.). **Attempts at isolating Verticillium albo-atrum B 11 B from the soil.** —Abs. in *Proc. Ind. Acad. Sci.*, 60, p. 79, 1950. [Received May, 1952.]

In studies at Purdue University, Indiana, flooding with soil dilutions the surfaces of plates of Czapek's medium which contained antibiotics proved the best method for isolating from soil the strain of *Verticillium albo-atrum* (B 11 B) [*R.A.M.*, 30, p. 431 and next abstract] responsible for the wilt disease of peppermint (*Mentha piperita*). The chances of obtaining *Verticillium* from the soil were greatly increased by the presence of plant debris in the soil samples.

Green (R. J.). **The phytopathology of Mentha piperita L.**—Abs. in *Proc. Ind. Acad. Sci.*, 60, pp. 97–101, 1950. [Received May, 1952.]

After a brief introductory history of the cultivation of peppermint (*Mentha piperita*) in the United States, a description is given of the three principal diseases on this host in the Indiana-Michigan area. Attempts at controlling *Verticillium* wilt [*V. albo-atrum*: see preceding abstract], the most important of the three, by ordinary rotation have so far been unsuccessful, while such cultural measures as controlled water tables in the drained muck soils and overhead irrigation have allowed a profitable yield without permanent control. The wilt is not yet known in the west coast mint plantings. Frequent dusting with 20–80 copper-lime dust or spraying with 6–6–100 Bordeaux mixture proved effective against peppermint anthracnose (*Sphaceloma menthae*) [ibid., 30, p. 192] and may be used in localized outbreaks of the disease. In the western States where late autumn ploughing is not practised mint rust (*Puccinia menthae*) [see next abstract] is a serious problem. However, applications of dusting sulphur or spraying with 8–8–100 Bordeaux mixture at seven to ten-day intervals also give a good control.

Baxter (J. W.). **Physiologic specialization in Puccinia menthae.**—Abs. in *Phytopathology*, 42, 1, p. 2, 1952.

Puccinia menthae in the United States [*R.A.M.*, 31, p. 142 and preceding abstract] is stated to consist of at least 10 physiologic races, differentiable on the basis of their pathogenicity to species in eight genera of the Labiatae. The race attacking *Mentha spicata*, *M. arvensis*, and *M. rotundifolia* has been assigned the number 1, while race 2 infects *M. piperita*, *M. arvensis*, and *M. longifolia*. The other eight races are specialized, respectively, on *Monarda didyma*, *M. punctata*, *M. fistulosa*, *Blephilia hirsuta*, *Cunila origanoides*, *Satureja vulgaris*, *Pycnanthemum* spp., and *Monardella* spp.

Erwin (D. C.). **Phytophthora root rot of Safflower.**—*Phytopathology*, 42, 1, pp. 32–35, 2 graphs, 1952.

In addition to information on safflower root rot (*Phytophthora drechsleri*) [*R.A.M.*, 31, p. 206 and above, p. 339] in Nebraska already presented from another source [ibid., 30, p. 245], the author states that on maize meal agar the radial growth of the fungus reached a maximum at pH 7 and fell to a minimum at 4, while levels of 6 and 8 were more favourable to its development than 5. In soil moisture tests, 97·2 per cent. of the plants inoculated and raised in soil with high moisture content became diseased compared with 84·4 and 57·6 per cent. for soils with medium and low moisture contents, respectively. In pathogenicity tests in (1) clay-loam soil and (2) sand irrigated with a modified Hoagland's nutrient solution, one lot of each medium sterilized and the other not, more root rot developed in the sterilized (93 per cent.) than in non-sterilized (82 per cent.) and more in the sand than the clay, the very succulent plants grown in sand and nutrient solution being particularly susceptible.

Fifty-first Annual Report of the Bureau of Sugar Experiment Stations, Queensland. —55 pp., 3 pl., 4 graphs, 1951.

In the report of the Division of Entomology and Pathology by R. W. Mungomery (pp. 39–47) [cf. *R.A.M.*, 30, p. 581] it is stated that there is little doubt that ratoon stunting disease [loc. cit.] has decreased considerably in the Mackay district, although it was recorded throughout the Maryborough and Bauple areas during the year. The varieties showing an obvious reduction in growth after inoculation included Black Cheribon, P.O.J. 2725, P.O.J. 2878, Q. 56, and ten advanced seedlings. The growth of C.P. 29/116, Co. 290, Co. 301, E.K. 28, Glagah, N.Co. 310, P.O.J. 100, P.O.J. 213, Pindar, Q. 45, Q. 50, Vesta, and four advanced seedlings was only slightly reduced. Seedling G. 176 was the most susceptible of all the varieties tested. Treatment of diseased setts in hot water at up to 54° C. for 1¼ hours gave good germination and the growing canes so far appear healthy. Inoculation of healthy Q. 28 with sap from poorly grown crops of other varieties showed the disease to be present in P.O.J. 2878 and Q. 813. There are indications that sap from diseased cane does not remain infective for more than a day or two after extraction.

Yellow spot (*Cercospora kopkei*) [cf. ibid., 31, p. 207] was again present in epiphytotic form in the northern mill areas of the State, infection being heavier and more widespread than in the previous year. Varieties at the Northern Sugar Experiment Station classified as resistant were Atlas, B. 208, Badila, Badila Seedling, Cato, Co. 290, C.P. 29/116, D. 1135, Mahona, Oramboo, Orion, Pindar, P.O.J. 213, P.O.J. 2725, Pompey, Q. 44, Q. 47, Q. 813, S.J. 2, S.J. 16, and Vesta.

There was a general increase in the amount of pineapple disease (*Ceratostomella paradoxa*) [ibid., 30, p. 582] in most areas, particularly in the far north. In future all setts planted during the colder months may have to be dipped.

The incidence of Fiji [virus] disease is now so low that efforts are being made to eliminate all diseased fields as early as possible in the crop cycle. In resistance trials at Beenleigh and Moggill there was a complete absence of diseased stools in the varieties C.P. 29/320, C.P. 36/13, C.P. 36/62, and Pindar.

For the first time since detailed records were kept not a single stool infected with downy mildew (*Sclerospora sacchari*) was recorded anywhere in the State. In the downy mildew trial plot at Bundaberg the varieties C.P. 29/320, Ragnar, C.P. 34/79, C.P. 36/13, and M. 134/32 had 0, 0, 3, 4, and 5 per cent. diseased stalks, respectively, and can therefore be regarded as safe commercially.

Chlorotic streak [ibid., 31, p. 144] sprang into sudden prominence in the Maryborough district during the year, particularly on the alluvial soil of Island Plantations, Walker's Point, and Tinana. M. 1900S suffered substantial losses.

Gumming disease (*Xanthomonas vasculorum*) was not found at Mossman during the year. Leaf scald (*X. albilineans*) [loc. cit.] continues to be a problem in the wetter areas of North Queensland, heavy losses being sustained by some farmers in the Tully and other mill areas.

For all practical purposes the Burdekin area may be considered the northern limit of the range of sugar-cane mosaic [virus: ibid., 29, pp. 331, 478]. At Bundaberg Q. 50 was infected. In Q. 42 the difference in yield between 'healthy' and 'diseased' cane is significant at the 1 per cent. level and represents a loss of one ton of sugar per acre. This demonstrates clearly that mosaic can cause heavy losses in susceptible varieties [cf. ibid., 31, p. 143].

Abbott (E. V.). **Sugarcane disease work at the Houma Station during 1950.**—*Sug. Bull., N.O.*, 29, 23, pp. 392–398, 1951.

Of recent years there have been several instances of the occurrence in Louisiana of sugar-cane mosaic virus in varieties rated as resistant. For instance, during

the past two years, 20 to 30 per cent. infection has been found in two important commercial varieties, C.P. 34/120 and C.P. 36/105. In nearly every case the most infective strain (A) of the virus [*R.A.M.*, 30, p. 545] was implicated. It was also obtained from one or more stools of C.P. 44/155, C.P. 44/101, Co. 290, and unreleased varieties at several locations, and constituted about 8 per cent. of 37 collections identified from the State in 1950. Strain A is responsible for definite stunting in C.P. 34/120 and C.P. 36/105. From the latest strain survey it appears that D, which was the most prevalent in Louisiana when Co. 281 was a leading commercial variety, has been superseded by B, associated with the extended cultivation of its preferred host, Co. 290.

A report is given of field-scale experiments on the fungicidal treatment of seed cane which have been in progress at Houma [ibid., 31, p. 298] since 1945, involving some 20 preparations, various methods of application, and the leading commercial varieties.

Boidin (J.). **Sur la présence des anses d'anastomose dans le carpophore de quelques basidiomycètes résupinés.** [On the presence of clamp-connexions in the carpophore of some resupinate basidiomycetes.]—*C. R. Acad. Sci., Paris*, 233, 15, pp. 824–826, 1951.

Using a phase contrast microscope in conjunction with a drastic preliminary alkaline treatment and a stain, e.g., Congo red in ammoniacal solution, the author was able to determine the presence or absence of clamp-connexions and their location in the mycelia of 70 species of resupinate basidiomycetes [cf. *R.A.M.*, 29, p. 436], the published descriptions of which are vague or erroneous in regard to this feature.

Petrak (F.). **Ergebnisse einer Revision der Grundtypen verschiedener Askomyzeten und Fungi imperfecti. II.** [Results of a revision of the basic types of various ascomycetes and fungi imperfecti. II.]—*Sydowia*, 5, 3–6, pp. 328–356, 1951.

Among the conclusions resulting from the author's review and discussion of type material of a further 34 genera of ascomycetes and fungi imperfecti (Part I in *Sydowia*, 5, 1–2, pp. 169–210, 1951) is that *Falcispora* Bub. & Sereb. and *Pseudoseptoria* Speg. are synonyms of *Selenophoma* Maire [*R.A.M.*, 27, p. 324]. Revised descriptions of some of the genera are given.

Teramoto (T.). **Contributions to the Japanese fungus flora II.**—*Bull. Tokyo Univ. For.* 39, pp. 209–218, 3 figs., 1951. [Japanese, with English summary.]

A systematic study is made of eight Polyporaceae, including *Hirschioporus laricinus* n.comb. (for *Lenzites laricina*), *Piptoporus* [*Polyporus*] *quercinus* [*R.A.M.*, 31, p. 305] causing a brown cubical rot of *Castanea crenata* logs, *Trametes heteromorpha* [ibid., 29, p. 340] growing mainly on conifers in the northern part of the northern hemisphere, and *Tyromyces* [*Polyporus*] *borealis* causing heart rot in living conifers [ibid., 22, p. 187; 30, p. 389] in Europe, North America, and Japan.

Perišić (M. M.). **Prilog poznavanju parasitne mikroflore u Metohiji u 1949 godini.** [Contribution to the knowledge of the parasitic microflora of Metohija in 1949.] —Заштита Биља [*Plant Prot., Beograd*], *1951*, 3, pp. 73-75, 1951. [French summary.]

This list of pathogenic fungi reported in 1949 from the Metohija region, Yugoslavia, includes the following: *Clasterosporium carpophilum* [C.M.I. map. No. 188] on sour and sweet cherry, *Gnomonia juglandis* [*G. leptostyla*: *R.A.M.*, 26, p. 186] and *Microstroma juglandis* [ibid., 25, p. 427] on walnut, *Gymnosporangium sabinae* on pear [ibid., 26, p. 229; 31, p. 191], *G. confusum* on quince [ibid., 11, p. 145; 27,

p. 115], *Sphaerotheca humuli* on hop [ibid., 26, p. 317], and *S. pannosa* var. *persicae* on peach [ibid., 26, p. 356].

WICKERHAM (L. J.). **Taxonomy of yeasts.**—*Tech. Bull. U.S. Dep. Agric.* 1029, 56 pp., 5 pl., 1 diag., 1951.

There is evidence that previous methods of classifying yeasts [*R.A.M.*, 28, pp. 190, 349] have led to the unintentional splitting of natural groups into sections, so that all the larger genera of both the sporogenous and asporogenous yeasts contain unrelated types. In the present classification, which is based largely on studies of recent isolates from nature collected by the author [cf. ibid., 26, p. 81] and by contemporary workers, many more physiological characteristics are used for recognizing individual species. Each generic description is made to include all the species in one phylogenetic line only. In Part I descriptions are given of the techniques used for yeast classification comprising procedures for isolating and preserving cultures [ibid., 29, p. 523], for studying sporulation [ibid., 30, p. 333] and morphology, and for performing assimilation, fermentation [ibid., 30, p. 481], vitamin deficiency, and other tests. Part II presents a classification of the genus *Hansenula* [ibid., 25, p. 13; 26, p. 117], which is maintained distinct from *Pichia*, based on the above methods and the phylogenetic conceptions of the author. *Hansenula* spp. are physiologically more active than *Pichia* spp. in nitrate utilization and in the number of carbon sources assimilated. Among the new species described are *H. capsulata* isolated from insect tunnels in pine and spruce; *H. angusta* from concentrated orange juice; and *H. mrakii* from soil.

Nuevas determinaciones micológicas para Chile. [New mycological determinations for Chile.]—*Agric. tec., Chile*, 11, 1, pp. 86–90, 1951.

Included in this annotated list of recent additions to the mycoflora of Chile [cf. *R.A.M.*, 29, p. 584] are *Botrytis cinerea* on pine [ibid., 17, p. 567]; *Cercospora cladosporioides* on olive [ibid., 23, p. 349]; *Cytospora chrysosperma* [*Valsa sordida*: ibid., 31, p. 39] on the hybrid AM (Arnaldo Mussolini) poplar, *Salix babylonica* [ibid., 25, p. 578], and *Robinia pseudo-acacia*; *C. microspora* [ibid., 14, p. 450] on quince; *Monilia cinerea* [*Sclerotinia laxa*: C.M.I. map No. 44] on peach; *Plectodiscella* [*Elsinoe*] *piri* [*R.A.M.*, 26, p. 65], *Valsa leucostoma* [ibid., 22, p. 42; 26, p. 230; 28, p. 5], and *Schizophyllum commune* [ibid., 27, p. 241; 29, p. 293] on apple; *Stereum purpureum* [C.M.I. map No. 30] on *Salix viminalis*, and *Taphrina ulmi* on elm (*Ulmus americana*) [*R.A.M.*, 25, p. 539].

ESFANDIARI (E.). **Neue iranische Pilze.** [New Iranian fungi.]—*Sydowia*, 5, 3–6, pp. 366–370, 1951.

The nine new species described in this further contribution to the mycoflora of Persia [*R.A.M.*, 29, p. 336] include *Cladosporium manoutchrehil* on oak (*Quercus atropatena*) and *Helminthosporium iranicum* on *Indigofera* sp., both parasitizing the foliage.

MÜLLER (E.). **Die schweizerischen Arten der Gattungen Clathrospora, Pleospora, Pseudoplea und Pyrenophora.** [The Swiss species of the genera *Clathrospora*, *Pleospora*, *Pseudoplea*, and *Pyrenophora*.] –*Sydowia*, 5, 3–6, pp. 248–310, 20 figs., 1951.

Included in this critical discussion of the genera *Wettsteinina*, *Clathrospora*, *Pleospora* (with 53 Swiss species), *Pseudoplea*, and *Pyrenophora* [cf. *R.A.M.*, 31, p. 89], with full descriptions of all the Swiss species, are a new subgenus, several new species and new combinations, and a new name. Keys for the determination of the genera and species are provided.

Sanwal (B. D.). **On some new or noteworthy Ravenelias from India.—I.**—*Sydowia*, 5, 3–6, pp. 412–417, 1951.

The author gives an emended description of *Ravenelia ornata* Syd., diagnoses of three new species of the genus on *Acacia* in India (*R. acacia-senegalae*, *R. acacicola*, and *R. ajmerensis*), and a table showing some characters of 11 species of *Ravenelia* on *Acacia*.

Pfaeltzer (J. W.). **Studies in blister blight control. VI. An evaluation of some commercially available fungicides for the control of blister blight.**—*Tea Quart.*, 22, 2, pp. 52–55, 1951.

In a further contribution to this series [cf. *R.A.M.*, 30, p. 585] the efficiency of a large number of commercial fungicides in controlling blister blight of tea [*Exobasidium vexans*: ibid., 31, p. 210] was determined in 1950 in a large-scale, statistically randomized trial at the Tea Research Institute, St. Coombs, Ceylon, in co-operation with the Shell Laboratories, Amsterdam. The materials were applied at weekly intervals with hand sprayers at the rate of 120 l. per ha., the standards for comparison being perenox and Shell copper fungicide, both at 0·2 per cent. (4 oz. per 10 gals. water). The plots were examined for leaf and stem infection, die-back of the young shoots, and amount of defoliation after the fourth, fifth, sixth, and seventh sprayings. Severe blister blight had been present on the plot during the two previous years. The test bushes were given a normal pruning on 9th and 10th May, ten days before the monsoon rains. Unpruned bushes acted as foci of infection and at the time spraying was started, one month after pruning, they showed 90 per cent. infection. Bordeaux mixture (5–5–50); cuprous oxide in the form of yellow cuprocide and copper Sandoz; copper oxychloride in the form of coppesan [ibid., 29, p. 389] and cuprokylt [ibid., 31, p. 81]; bioquin; vitosan (a mixture of copper oxychloride and copper-8-hydroxyquinoline supplied by Vitax Fertilisers); the calcium polysulphide compound sulfinette [ibid., 9, p. 627 *et passim*]; and dithane Z-78 all gave a control equivalent to perenox and Shell copper.

Knight (C. A.). **Dinitrophenyl derivatives of some strains of Tobacco mosaic virus.**—*J. biol. Chem.*, 192, 2, pp. 727–731, 1951.

At the Virus Laboratory, University of California, Berkeley, dinitrophenol derivatives were made of the ordinary, J14 D1, and HR [Holmes's rib grass] strains of tobacco mosaic virus [*R.A.M.*, 31, p. 150]. The infectivities and extent of interactions with amino, thiol, phenol plus indole, guanidino, and peptide groups of the derivatives were compared with control samples of the several strains. Although considerable differences were observed between them in respect of infectivities on *Nicotiana glutinosa* (17 per cent. for HR, 35 for J14 D1, and 61 for ordinary) and degree of reaction of various chemical groups, no definite correlation of pathogenicity with a particular grouping was established.

Fulton (R. W.) & Johnson (J.). **Mosaic resistance in Wisconsin Tobacco.**—Abs. in *Phytopathology*, 42, 1, p. 8, 1952.

[At the Wisconsin Agricultural Experiment Station] the necrotic local lesion type of resistance (N factor) to tobacco mosaic virus [*R.A.M.*, 30, p. 632 and next abstract] has been incorporated in tobacco closely resembling Havana Seed Types. Lines derived from crosses of Wisconsin tobacco with mosaic-resistant Burley approximated more nearly to Wisconsin types than did lines from crosses with dark tobaccos. Segregation in the F_2 for mosaic resistance and chlorophyll characters approached the ratios expected on the basis of independent factors. Selected F_5 lines from the original cross seem to be equal or superior in commercial type, quality,

and yield to those back-crossed four times to the commercial parent. Heavy virus inoculation resulted in appreciable amounts of systemic necrosis only during the hot summer of 1949, the incidence of necrotic infection among the different lines ranging from 0 to 48 per cent. Several otherwise desirable lines are susceptible to a late-season leaf spotting which is of little or no importance on other lines or on Havana Seed. Small-scale trials demonstrated very satisfactory mosaic resistance and commercial acceptability. Cucumber mosaic virus was seldom observed on mosaic-resistant tobacco.

VALLEAU (W. D.). **The evolution of susceptibility to Tobacco mosaic virus in Nicotiana and the origin of the Tobacco mosaic virus.**—*Phytopathology*, 42, 1, pp. 40–42, 1952.

Evidence is adduced from studies at the Kentucky Agricultural Experiment Station in support of the author's hypothesis that the reactions of species of *Nicotiana* to the tobacco mosaic virus may all have originated through mutations of the dominant *N* [see preceding abstract] and *A* genes, occurring in a practically immune *NNAA* progenitor, without the intervention of the virus [*R.A.M.*, 22, p. 328; 28, p. 491].

HOLDEMAN (Q. L.) & GRAHAM (T. W.). **Ascochyta leaf spot in Tobacco plant beds in South Carolina.**—*Plant Dis. Reptr*, 36, 1, p. 8, 1952. [Multilithed.]

A fungus tentatively identified as *Ascochyta gossypii* was isolated in April, 1951, from leaf spots on tobacco at Latta and Olanta, South Carolina [cf. *R.A.M.*, 17, p. 632; 25, p. 292]. Inoculations with both collections of the fungus on tobacco seedlings produced lesions in 48 hours. The tobacco isolates and an *Ascochyta* from cotton showed similar pathogenicity to cotton cotyledons [ibid., 30, p. 229] and tobacco leaves. It is concluded that both the tobacco and the cotton organism belong to the same species.

STEINBERG (R. A.). **Occurrence of Bacillus cereus in Maryland soils with frenched Tobacco.**—*Plant Physiol.*, 26, 4, pp. 807–811, 1951.

Samples of soils producing normal and severely frenched tobacco [*R.A.M.*, 31, p. 226] and of normal and frenched roots were collected on seven southern Maryland farms during the summer of 1950 and analysed for their populations of *Bacillus cereus* [ibid., 29, p. 281]. In six paired samples of rhizosphere soil, the bacterial populations were higher in the frenching than in the normal soils, the average of the former being 1·65 times that of the latter. Frenched tobacco roots harboured particularly large populations of *B. cereus*, the numbers of which were several times higher than those hitherto reported for normal plant roots.

These observations are considered to point to the likelihood of an etiological relationship between the *B. cereus* population of a given soil and its tendency to produce frenched tobacco.

CELINO (M. S.) & GOTTLIEB (D.). **Control of bacterial wilt of Tomatoes by Bacillus polymyxa.**—Abs. in *Phytopathology*, 42, 1, p. 4, 1952.

An isolate, B3A, obtained from Philippine soil, of a bacterium tentatively identified as *Bacillus polymyxa*, the producer of polymyxin [*R.A.M.*, 31, p. 196], gave promising results in the control of bacterial wilt of tomato (*Bacterium* [*Pseudomonas*] *solanacearum*) [ibid., 29, p. 64] when added to infested soil in the form of a broth culture 19 days before planting Bonny Best seedlings. Plants in the treated plots developed only 33 per cent. wilt as against 79 per cent. in the controls.

Ankudinov (A. M.). Причины отпада сеянцев в лесопитомниках и меры борьбы с ним. [Reasons for the decay of seedlings in forest nurseries and control measures against it.]—Лесное Хозяйство [*Forest Husbandry*], 20, 5, pp. 26–30, 3 figs., 1950.

In studies on seedling diseases at the Pan-Soviet Scientific Research Institute of Forest Husbandry several soil fungi of the genus *Fusarium* and a few of *Alternaria* were found to be responsible, in addition to other factors, for the heavy losses of pine seedlings in 1949, in spite of the great drought in the first part of the growth period when these fungi are not normally active. *Fusarium* seedling wilt was most severe in Tatarian maple [*Acer tataricum*] and acute-leaved maples [*A.* sp.], less so in elms, *Amorpha*, and mulberry, while only single attacks developed in ash and Siberian yellow acacia. Attempts at control with formalin were unsuccessful.

Barnett (H. L.). **A rapid method for determining Oak wilt.**—*Phytopathology*, 42, 1, p. 57, 1952.

An accelerated method for the diagnosis of oak wilt (*Chalara quercina*) [*R.A.M.*, 31, p. 306 and following abstracts], which takes two to three weeks by the standard technique, is described from West Virginia University. When fresh decorticated chips from diseased trees are inserted in tubes of a liquid medium, typical conidiophores and conidia are produced within five days at 25° C. Sporulation was most profuse in glucose-casein hydrolysate and scantiest in distilled water; dilute malt extract, potato extract, and sucrose-asparagine were intermediate. Satisfactory sporulation was obtained with 5 gm. sugar per l. Synthetic media must be enriched with biotin, for which the fungus is deficient.

An alternative procedure, eliminating any serious risk of contamination by other fungi, involves the culture of the chips on agar for four or five days until some mycelium is formed, when isolates having the appearance of *C. quercina* may be transferred to a dilute liquid medium and incubated for two days at or a little below 25°; conidiophores and conidia should then appear in abundance. The conidiophores produced in submerged culture are hyaline and shorter (20 to 40 μ) than those formed aerially.

Bretz (T. W.). **New hosts for the Oak wilt fungus, Chalara quercina Henry.**—Abs. in *Phytopathology*, 42, 1, p. 3, 1952.

In greenhouse inoculation tests [? in Missouri] potted one- to four-year-old trees of *Lithocarpus densiflorus*, *Castanopsis sempervirens*, European chestnut (*Castanea sativa*), and the Asiatic oaks, *Quercus acutissima* and *Q. dentata*, proved to be equally susceptible to isolates of *Chalara quercina* [see preceding and next abstracts] from northern red oak [*Q. borealis*] and Chinese chestnut [*C. mollissima*: *R.A.M.*, 30, p. 394]. The first evidence of infection was a marked upward and inward rolling of the leaf blades on the leader and at the ends of the lateral branches, accompanied by a noticeable stiffening of the foliage. The next stage was progressive loss of leaf colour, culminating in the death and browning of the foliar tissues, the whole plant finally becoming involved. In all cases the dead leaves remained attached. Before they died some trees produced numerous suckers from the lower part of the main stem. The leaf symptoms were usually associated with discoloration of the wood near the cambial region. The pathogen was reisolated from all the host species inoculated.

Bretz (T. W.). **The perithecial stage of Chalara quercina Henry.**—Abs. in *Phytopathology*, 42, 1, p. 3, 1952.

Grown together on certain culture media, compatible strains of *Chalara quercina* [*R.A.M.*, 30, p. 635 and preceding abstracts] give rise in seven to ten days to

perithecia of a *Ceratostomella* sp., the spherical base, 240 to 380 μ in diameter, almost entirely embedded in the subiculum, above which protrude erect, black beaks, 250 to 450 μ long, terminating in a cluster or fringe of hyaline hyphae. The globose to subglobose, evanescent asci measure 7 to 10 μ at the greatest diameter. The hyaline, unicellular, elliptical, slightly curved ascospores collect at the ostiole in a viscous, creamy-white mass, which does not disintegrate in water. They germinate rapidly in 2 per cent. dextrose solution at 25° C. by a single germ-tube, from which arise typical endoconidia of *Chalara quercina*. The inoculation of susceptible species directly with ascospores and with single ascospore isolates resulted in the development of typical oak wilt symptoms. Asexual, thick-walled, olivaceous spores of variable shape and size, arising endogenously or intercalarily in hyphae which may also produce the hyaline endoconidia, were detected in cultures forming perithecia. Neither the coloured spores nor perithecia have been observed in nature.

Pavari (A.). **La lotta contro il cancro corticale del Castagno in Italia.** [Chestnut bark canker control in Italy.]—*Schweiz. Z. Forstw.*, 102, 11, pp. 572–579, 4 figs., 1951. [German summary.]

Information is recapitulated on the methods sponsored by the Italian Government for the control of *Endothia parasitica* on chestnuts [*R.A.M.*, 30, p. 438 and following abstracts].

Baldacci (E.) & Orsenigo (M.). **Chestnut blight in Italy.**—*Phytopathology*, 42, 1, pp. 38–39, 1 fig., 1 map, 1952.

At the end of the summer, 1950, chestnut blight (*Endothia parasitica*) in Italy [see preceding abstract] was known to cover an area of 120,723 ha. and suspected of occurring on another 15,245. The disease now involves some 15 per cent. of the entire chestnut area of the country, causing heavy mortality in places where it has been established for considerable periods.

An intensive study was made of the conidia and ascospores of numerous isolates of *E. parasitica* from different parts of Italy. The average dimensions of the conidia on the host and in culture were 3·4 by 1·6 and 3·7 by 1·6 μ, respectively, while the ascospores on the bark measured 9 by 4·15 μ. A culture of the fungus from chestnuts at Pavia, Lombardy, was submitted to Dr. G. F. Gravatt, Division of Forest Pathology, United States Department of Agriculture, who considered it to be identical with those obtained from American and Asian material. Another isolate from Lombardy, grown in the dark at 18° to 24° C. on beer wort agar for seven to ten months, produced black, globose perithecia, 150 to 230 (mean 180) μ in width, with a cylindrical, straight, curved, or undulating neck 380 to 730 (590) by 45 to 90 μ, this being the first report of the development of the perfect state in culture.

Šebenik (M.). **Rak Kestenove kore u kotary Nova Gorica.** [Chestnut bark canker in the district of Nova Goritza.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 5, pp. 75–79, 2 maps, 1951. [French summary.]

Reviewing the condition during the past few years of the Panovetz forest near Nova Goritza, where *Endothia parasitica* was first discovered on chestnut in Yugoslavia [*R.A.M.*, 30, pp. 438–9, and next abstract], the author attempts to account for the occurrence of the disease in this district and examines the possibility of its future spread.

Krstić (M.). Рак Кестенове коре — актуални европски проблем. [Chestnut bark canker—a current European problem.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 8, pp. 41–49, 1 pl. (pp. 32–33), 1951. [French summary.]

A programme is suggested for the control of *Endothia parasitica* on chestnut in Nova Goritza, Yugoslavia [see preceding abstract].

Aoshima (K.). **Studies on Birch-wood-rotting fungus, Fuscoporia obliqua (Pers.) Aoshima, comb. nov.**—*Bull. Tokyo Univ. For.* 39, pp. 185–207, 2 pl., 2 figs., 1951. [Japanese, with English summary.]

A study is reported of the morphology, physiology, and pathology of the birch wood-rotting fungus, formerly termed sterile *Fomes* or canker-like body [cf. *R.A.M.*, 18, p. 145], which is widespread in the sub-Arctic forests of Japan, seriously damaging the heartwood of dakekamba (*Betula ermanii-communis*), udaikamba (*B. maximowicziana*), and mizume (*B. grossa*). Fruit bodies were found beneath the bark of fallen trees which had been destroyed by the fungus. They were also produced in culture and were compared morphologically with material from Europe, the United States, and Canada. The author observed setal hyphae [loc. cit.] in the tramal mycelia of the sclerotium on birch trunks. Comparative studies of six strains of the birch fungus from Japan, two from Canada, and two strains of *Polyporus glomeratus* also from Canada [ibid., 18, p. 487; 28, p. 553] indicated that the Japanese and Canadian strains of the birch fungus were identical and distinct from *P. glomeratus*. Accordingly, the birch fungus is named *Fuscoporia* (*Poria*) *obliqua* nov. comb. [ibid., 29, p. 542]. The mycelium develops most rapidly at 26° to 29° C. on koji extract, malt extract, and potato dextrose agars. Lines of antagonism were produced between colonies of *P. obliqua* and *Phellinus* [*Fomes*] *igniarius* in mixed culture. It showed a positive reaction in media containing both tannic and gallic acid (0·3 per cent.). Of various coniferous and broad-leaved woods tested the sapwood of birch was destroyed most rapidly while the heartwood of sugi (*Cryptomeria japonica*) and sawara (*Chamaecyparis pisifera*) was extremely resistant. The fungus fruits only when the tree is completely destroyed and falls to the ground.

Tokushige (Y.). **Witches'-broom of Paulownia tomentosa L.**—*J. Fac. Agric. Kyushu Univ.*, 10, 1, pp. 45–67, 13 figs., 2 diags., 1951.

From the southern regions of Japan and Korea a very severe witches' broom of *Paulownia tomentosa* is gradually spreading to other districts. Among its characteristics are incessant sprouting of the axillary buds from the spring until the late autumn; unrestricted growth of the slender, brittle, chlorotic shoots and branches, which show an extreme negative geotropism; anomalies in the development of the marginal indentations on the abnormally thin, narrow, superficially uneven, yellowish, often malformed leaves; and sparse growth of unbranched hairs on the lower leaf surface, in contrast to the dense coating of branched hairs on healthy foliage. Diseased trees have slow-growing, weak, and internally discoloured roots, and the distribution of the vessels and cells of the woody cylinder is irregular. The symptoms appear in May or June and may involve any part of the tree. Many of the diseased leaves are shed prematurely, abscission progressing upwards from the base of the shoot but the small leaves on the upper part remain attached, the axillary buds continuing to sprout as mentioned above. One- to two-year-old trees affected by the witches' broom may die during the current or the next season, while older ones suffer a great loss of vigour and do not survive more than a few years.

The disease was originally attributed to *Gloeosporium kawakamii* [*R.A.M.*, 13, p. 411], but this explanation of its etiology was rejected by Yoshii (*Ann. Meet. phytopath. Soc. Japan*, 1933). In the present author's transmission experiments in 1948–9, 18 plants of *P. tomentosa* raised from seed and 12 out of 15 from root shoots contracted the disease when grafted with infected scions; five out of six from root shoots grafted on diseased stocks developed witches' broom; and three *P. fortunei* plants grafted with diseased scions of *P. tomentosa* became affected. A period of about 55 days elapsed between grafting and the appearance of symptoms on the

stocks. It is concluded from these results that the agent of the witches' broom of *P. tomentosa* is a graft-transmissible virus.

VAN VLOTEN (H.). **Evidence of host-parasite relations by experiments with Phomopsis pseudotsugae Wilson.**—*Scot. For.*, 6, 2, pp. 38–46, 7 figs., 4 graphs, 1952.

In 1948 an experiment was laid out in a 13-year-old stand of Japanese larch at Wageningen, Holland, to study the effect of various forms of artificial damage on attack by *Phomopsis pseudotsugae* [cf. *R.A.M.*, 30, p. 184]. Some of the wounds were inoculated with pure culture spore suspensions of the fungus. The experiment was continued over a period of three years. The results obtained showed that *P. pseudotsugae* is able to attack and kill living bark, but only when wounds are present. Infection is highest when wounds are made early in the resting period of the trees. The fungus is checked by the activity of the trees during the growing season. Brashing with a stick does not conduce to infection by *P. pseudotsugae* when carried out in May, June, or July. Smooth-barked trees are more susceptible to infection than rough-barked, as the latter are more resistant to wounds.

MEIERHANS (J.). **Herpotrichia-Versuche 1950/51.** [*Herpotrichia* experiments 1950–51.]—*Schweiz. Z. Forstw.*, 102, 10, pp. 526–529, 1 fig., 1951.

Details are given of experiments performed at Spirigen, Switzerland, on $1\frac{1}{2}$- and $4\frac{1}{2}$-year-old spruces in the winter of 1950–1 to confirm Zobrist's observations as to the efficacy of snow fungus dust No. 3979 in the control of *Herpotrichia nigra* [*R.A.M.*, 30, p. 498 and next abstract]. In the first test the incidence of infection was reduced from 82·7 to 27 per cent. by the application of the fungicide on 16th October to the trees and soil, and in the second from 59·1 to 3 per cent.

ZOBRIST (L.). **Schutz der diesjährigen Fichtensaaten gegen den schwarzen Schneeschimmel.** [Protection of the current year's Spruce seedlings against the black snow fungus.]—*Schweiz. Z. Forstw.*, 102, 10, pp. 529–530, 1 fig., 1951.

The author reports absolute control of *Herpotrichia nigra* on young spruce seedlings in the Urserental, Switzerland, by copious applications to the plants and surrounding soil on 7th October, 1950, of snow fungus dust [3979: see preceding abstract].

JACKSON (L. W. R.). **Influence of littleleaf on quality of Shortleaf Pine seed.**—*Phytopathology*, 52, 1, pp. 57–58, 1 fig., 1952.

An examination at the School of Forestry, University of Georgia, of four lots of shortleaf pine (*Pinus echinata*) seed, (1) from healthy trees and the others from those affected by (2) incipient, (3) moderate, and (4) severe little leaf [associated with *Phytophthora cinnamomi*: *R.A.M.*, 31, p. 41] showed that (1) produced 66,240 seeds per lb., the percentage of seeds filled was 84, the average cone weight 6·6 gm., and the percentage of total germination 74; the corresponding figures for (2) were 67,260, 72, 3·3, and 62; (3) 91,717, 57, 2·4, and 24·5; and (4) 108,095, 24, 2·5, and 4, respectively. The most important aspect of this general deterioration due to little leaf was the drastic reduction in germinative capacity. Whereas emergence from healthy seed usually begins about 12 days after planting, periods of 60 and 125 days elapsed before the inception of the process in moderately and severely diseased lots, respectively, and germination of seed from severely affected trees was not completed until 190 days after sowing.

The quality of tree seed is known to depend on the accumulation of reserve foods produced by photosynthesis, and the deterioration in the case of little leaf would thus appear to be associated with factors affecting the synthesis of carbohydrates.

Troshchanin (P. G.). Устойчивость сеянцев Сосни в географических посевах. [Resistance of Pine seedlings in regional sowings.]—Лесное Хазяйство [*Forest Husbandry*], 20, 5, pp. 79–81, 1 fig., 1950.

The author first noticed the mass infection of one-year-old pine seedlings with *Sclerotinia graminearum* [cf. *R.A.M.*, 27, p. 227] in a Kasan' forest nursery, Tatar S.S.R., in 1936. Infection caused the top of the seedling to fall off at the slightest shake. Seedlings were usually injured 1 to 3 cm. below the apical bud and a dichotomy of the stem occurred at that spot. Oblong, dense sclerotia (4 to 4·5 cm. long and 1·5 to 2·5 mm. in diameter) were present. In May, 1946, similar symptoms were observed on 32·4 per cent. of pine seedlings in the forest nursery of the Bryansky region. All these seedlings were well developed and yet their tops turned yellow and eventually fell off. A 90 per cent. incidence was reported from the Karachev forest nursery where average height of the diseased seedlings was 8·3 cm. compared with 7·5 cm. for the healthy ones, root systems of both being similar.

An examination of seedling resistance to *S. graminearum* has shown seedlings grown from southern seeds to be more susceptible. *S. graminearum* was identified first by V. V. Gulyaev in 1948 as the fungus responsible for this disease.

Hussain (S. M.). **A serious heart rot fungus.**—*Pakistan J. For.*, 1, 4, pp. 384–388, 1 pl., 1951.

Information is presented on the pathology, sporophores, and cultural characters of *Fomes pinicola* in connexion with its occurrence in Pakistan, where it is the agent of a serious heart rot of *Abies pindrow* [cf. *R.A.M.*, 29, p. 392] on red clay or bouldery soil at elevation of 7,000 to 8,000 ft. about 20 miles from the Murree Hills.

Horgan (E. D.). **Wood preservative. A fungicide is found to lengthen life of containers and pallets while preventing product-tainting molds.**—*Mod. Packag.*, 25, 2, pp. 116–120, 9 figs., 1951.

Full particulars are given of the methods and results of experiments at Fungitrol Chemicals, Inc., Hillside, New Jersey, to determine the value of cellu-san (a water-repellent, non-irritant, non-toxic composition of zinc petroleum sulphonate) as a preventive of decay in wooden carriers and containers used for food-stuffs, soaps, and the like, and of fungal contamination of the products themselves. At a concentration of 5 per cent. in mineral spirits the compound gave eminently satisfactory results in respect of tensile strength retention. Control of *Lenzites trabea* and *Poria microspora* was effected on southern yellow pine sapwood blocks prepared to retain 2 or 1 lb. of the fungicide per cu. ft., assessed by Leutritz's accelerated technique [*R.A.M.*, 31, p. 156]. Protection of yellow birch veneers against *Trichoderma* [? *viride*] was conferred by dipping in a 1:2 dilution.

Chorin (M.) & Palti (J.). **Leaf, stem and fruit diseases of vegetables of the Solanaceae in Israel.**—63+viii pp., 21 figs., Tel-Aviv, 'Sifriat Hassadeh', 1951. [Hebrew, with English summary.]

Phytophthora infestans is widespread in Palestine on potatoes [*R.A.M.*, 28, p. 79] and tomatoes [ibid., 28, p. 91] in the field and in seed-beds; it occasionally attacks eggplants in the seed-bed but seldom affects field crops. *Oidiopsis* [*Leveillula*] *taurica* [loc. cit. and ibid., 24, p. 476] affects tomatoes, though seldom in the coastal plain; on chillis and eggplants the disease is widespread in all parts of the country, including the coastal plain, and does not appear to be specially favoured by dry conditions. Only two records exist on potatoes [cf. ibid., 26, p. 532], one from the Dead Sea area. *Septoria lycopersici* [ibid., 24, p. 476] occurs sporadically on tomatoes in most parts of the country, but has not been recorded in Galilee. In the coastal

plain the disease affects spring tomatoes from March to June and autumn plantings in November and December; in the valleys it is usually found in early spring on crops planted in late autumn. *Phoma destructiva* is widespread in all tomato growing areas in autumn, winter, and spring. *Xanthomonas vesicatoria* [ibid., 28, p. 91] affects only tomatoes in Palestine; the disease is sporadic, but may be destructive. In the inner valleys it occurs only during the rainy period, whereas in the coastal plain it also appears in autumn. Fungicidal treatment is of little use; farmers are advised to check the source of their seed, and avoid overhead irrigation. *Bacillus polymyxa* [ibid., 27, p. 458] affects chilli fruits all along the coastal plain from July until autumn.

Childers (N. F.), Winters (H. F.), Robles (P. S.), & Plank (H. K.). **Vegetable gardening in the tropics.**—*Circ. fed. Exp. Sta. P.R.* 32, 143 pp., 39 figs., 5 diags., 3 graphs, 1950. [Received April, 1952.]

In this handbook a section (pp. 98–139) devoted to disease and insect control includes a list (pp. 102–108) of the common tropical vegetable diseases with symptoms and control. Among those not previously recorded in Puerto Rico are *Phoma lingam* on crucifers [C.M.I. map No. 73], *Colletotrichum lindemuthianum* on legumes [C.M.I. map No. 177], and *Uromyces appendiculatus* on bean [*Phaseolus vulgaris*: cf. *R.A.M.*, 26, p. 180]. Also included are *Cercospora apii* var. *carotae* on carrot [cf. ibid., 22, p. 154; 25, p. 541], *Fusarium vasinfectum* on okra [*Hibiscus esculentus*], and the potato viruses leaf roll [ibid., 25, p. 42; 30, p. 533], spindle tuber [loc. cit.], mild mosaic [virus X: ibid., 25, pp. 42, 468; 30, p. 533], and rugose mosaic [virus Y: ibid., 29, p. 580; 30, p. 533].

Work (P.). **What to catalog for 1953.**—*Seed World*, 70, 4, pp. 8, 48–49, 3 figs., 1952.

This list, compiled with the assistance of Professor J. Carew, in charge of trials at Cornell University, New York, and of various seedsmen, comprises new varieties of vegetables. Among those mentioned as being disease-resistant are Emerson Pascal celery fairly resistant to early blight [*Cercospora apii*: *R.A.M.*, 26, p. 140] and late blight [*Septoria apii-graveolentis* and *S. apii*: ibid., 12, p. 196; 17, pp. 498–9] and Delicious 51 celery resistant to *Fusarium* sp. [ibid., 24, p. 216], Ironsides watermelon resistant to *Fusarium* [*bulbigenum* var. *niveum*: ibid., 31, p. 165], and Georgia 47 muskmelon resistant to downy mildew [*Pseudoperonospora cubensis*: ibid., 29, p. 372].

Armstrong (G. M.) & Armstrong (Joanne K.). **Physiologic races of the Fusaria causing wilts of the Cruciferae.**—Abs. in *Phytopathology*, 42, 1, p. 1, 1952.

Radish, stock [*Matthiola* sp.], and other cruciferous plants were inoculated [? at the South Carolina Agricultural Experiment Station] with monospore isolates of wilt-inducing species of *Fusarium* from cabbage [*R.A.M.*, 30, p. 453] and radish [ibid., 28, p. 370]. The cabbage strain was highly pathogenic to its own host, some other members of the cabbage tribe, and radish, and moderately so to *Matthiola*, while the radish *Fusarium* caused severe damage to radish and one variety each of Brussels sprouts and kale. The cabbage and radish strains were non-toxic to wilt-susceptible species of 18 genera not belonging to the Cruciferae, while 18 wilt inducing strains of *Fusarium* from other hosts failed to infect one variety each of cabbage and radish. It is proposed to designate the *Fusarium* strains from cabbage, radish, and probably *Matthiola* as physiologic races of *F. conglutinans*, since there is a common host. Thus, the strain originally described from cabbage would be known as race 1, the one with a high degree of pathogenicity, chiefly to radish, as race 2, and the *Matthiola* strain probably as race 3.

Berkeley (G. H.) & Weintraub (M.). **Turnip mosaic in Ontario.**—Abs. in *Phytopathology*, 42, 1, p. 2, 1952.

The virus responsible for a mosaic of swedes first observed in Ontario, Canada, in 1946 proved to be readily transmissible by sap inoculation (using carborundum as an abrasive) to tobacco, *Nicotiana glutinosa*, turnip, cabbage, cauliflower, rape, Chinese cabbage, mustard, stock [*Matthiola* sp.], wallflower, *Petunia*, peppergrass [*Lepidium sativum*], and shepherd's purse [*Capsella bursa-pastoris*]. Tobacco developed primary symptoms only, but the other hosts contracted systemic infection. The virus was purified by chemical means and its isoelectric point established at approximately pH 4·5. Subveinal strippings of turnip epidermis stained with trypan blue and phloxine [*R.A.M.*, 29, p. 246] disclosed amoeboid inclusion bodies up to 30 by 10 μ. The virus was destroyed by 10 minutes' exposure to a temperature of 62° C.; its longevity *in vitro* ranged from 24 to 36 hours. From a comparison with other virus diseases of crucifers it appears that the Ontario virus is similar to the turnip mosaic reported by Chamberlain from New Zealand [ibid., 19, p. 509] and most likely belongs to the turnip virus 1 [turnip mosaic virus: ibid., 30, p. 297] group.

Nikolić (V.). **Žutica Šećerne Repe — prethodno Saopštenje.** [Sugar Beet yellows—preliminary note.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 8, pp. 28–32, 1 pl., 1951. [English summary.]

Sugar beet yellows virus [*R.A.M.*, 31, p. 217] is reported from Zemun, Yugoslavia, for the first time. The disease is fairly widespread throughout the country and is probably of long standing.

Bronner (G.). **Wann ist die Bekämpfung der Blattkrankheiten rentabel?** [When is leaf disease control profitable?]—*Zucker*, 4, 17, pp. 357–360, 2 figs., 1 graph, 1951.

Conditions in the Danube Valley, especially in Upper Austria, where mists are frequent in August, are ideal for the development of beet leaf spot (*Cercospora beticola*) [*R.A.M.*, 26, p. 520 and next abstracts]. In humid, warm weather the writer has repeatedly found leaves bearing over 1,000 spots. Thirty dead leaves per plant represents severe infection, but in extreme cases there may be as many as 60.

The only reliable means of combating leaf spot in regions threatened by epiphytotics is by the application of copper sprays, beginning before infection takes place and continuing through August or even later, attacks having occurred in early September, 1950. The results of experiments covering a period of nearly 20 years at Enns have shown that susceptible varieties produce larger yields after spraying than do untreated, partially resistant ones. In 1950 two of the latter, CLR Buszczynzki and Sedlmayers Beta 242/53 gave 9 and 17 per cent. more sugar, respectively, on sprayed than on unsprayed plots. The only variety hitherto recognized as absolutely immune, US215×216/3, is so unproductive as to be useless for cultivation in Upper Austria.

Before the war 90 per cent. of the total area under sugar beet was sprayed three or four times with knapsack equipment; in 1950, when the treatment of 80 per cent. of the fields again became practicable, 64 per cent. (about 4,000 ha.) was sprayed on a co-operative basis with 38 motor machines. The average increase in bud and leaf yields resultant on spraying has been computed over a lengthy period as 40 and 70 doppelzentner [1 dz. = 200 kg.] per ha., respectively. In experiments at Enns under the supervision of the Vienna Plant Protection Institute, using three resistant and three susceptible varieties, average yields of beets and leaves (in dz. per ha.) and the sugar content (per cent.) in sprayed and unsprayed plots in 1949 were 439, 362, and 15·7, and 390, 252, and 15·3, respectively, the corresponding

figures for 1950 being 434, 305, and 17·3, and 380, 230, and 16·5, respectively. It is estimated that the increased yields obtained from three applications of a copper fungicide represent a financial gain amounting to seven times the outlay.

In Austria the loss of sugar consequent on disease is borne for the most part by the factory, but in Switzerland [ibid., 27, p. 220] it falls entirely on the producer. On a recent visit to that country the author learnt that the devastating epiphytotic of 1950 had resulted in a 2 per cent. loss of sugar. In this case the profit from spraying would have been eight times the cost. Heavy losses from leaf spot in 1950 were also reported from south Germany [see next abstract].

Plotho (O. v.). **Untersuchungen zur Morphologie und Physiologie der Cercospora beticola.** [Studies on the morphology and physiology of *Cercospora beticola*.] —*Zucker*, 4, 22, pp. 461–467, 6 figs., 1951.

The epiphytotic of sugar beet leaf spot (*Cercospora beticola*) in Württemberg, Baden, and Lower Bavaria [in 1950: see preceding and next abstracts] emphasized the advisability of an intensive study on the morphology and physiology of the fungus, which is fully described in relation to 22 contributions from the relevant literature. Most of the collections from the different localities represented the so-called 'American' form of the fungus, characterized by an ivory-coloured mycelium, but they also included a grey-green variant [*R.A.M.*, 7, p. 694]. Both forms caused a dark brown to red pigment to appear in the culture medium. The fungus throve on a medium containing various amino acids as sources of nitrogen and supplemented by *p*-aminobenzoic acid at a concentration of 0·0001 per cent., ascorbic acid (0·005), betoxin (0·005), carotin (0·001), sufficient lactoflavin to impart a faint coloration, and 1·8 per cent. agar, adjusted to pH 6. In a parallel series of liquid cultures at half strength, especially in test tubes containing gypsum, unglazed clay, and magnesium oxide, it produced complexes with a centre consisting of round cells from which radiated elongated, multicellular, coloured mycelial segments, resembling the conidial complexes found in the leaves of the host. It is thought that further experiments along the same lines might help to solve the difficult problem of conidial production by *C. beticola* in culture [ibid., 11, p. 347].

One of the prerequisite conditions for the spread of leaf spot, namely, a high relative humidity, is usually present in the affected regions, but temperatures of 20° C. and upwards, hitherto regarded as an equal necessity, do not normally prevail in May and June or even, for any length of time, in July and August, when outbreaks generally occur. Thus, from the observed increase in its incidence, the pathogen seems to be adapting itself, in respect of its temperature optimum, to German climatic conditions. The insistence of earlier workers on the need for fully open stomata for the entry of the fungus does not appear to be justified. The practical aspect of these environmental factors is briefly considered in connexion with the possibility of publishing local spray warnings.

Rademacher (B.). **Was wissen wir von der Blattfleckenkrankheit der Rübe (Cercospora beticola Sacc.)?** [What do we know about the Beet leaf spot disease (*Cercospora beticola* Sacc.)?]—Reprinted from *Neue Mitt. Landw.*, 6, 24–25, 11 pp., 1 fig., 1951.

A useful summary is given of the available information on beet leaf spot (*Cercospora beticola*) in connexion with the destructive outbreaks of the disease that occurred in south Germany in 1950 [see preceding and next abstracts], a year of uniformly high summer temperatures and heavy precipitation, especially in August and September. Similar conditions prevailed in central Europe in 1926–7 and in the summers of 1947 to 1949, and were likewise accompanied by severe infection; otherwise the fungus is more at home in warmer regions [C.M.I. map No. 96]. Reductions in the German beet harvest may range from 10 to 20 per cent. and in the sugar

content from 1 to 2 per cent. Fodder varieties are generally liable to heavier damage on account of their scanty foliage, and among the sugar varieties, the more luxuriant the foliage, the less is the damage caused. The firm of Rabbethge-Giesecke has been specializing for years in the development of resistance to leaf spot, and at the Stuttgart-Hohenheim Plant Protection Institute their CR variety has long been practically free from infection. Their Polyploide is also very resistant, though not quite equal to CR, while another promising line (tested only in 1950) is the Viennese Y_1P.

Heinisch (O.). **Die negative Auslesung der Zuckerrübenstecklinge im Herbst.** [The negative selection of Sugar Beet stecklings in the autumn.]—*Dtsch. Landw.*, 2, 12, pp. 623–626, 12 figs., 1951.

A number of fungal, bacterial, and virus diseases are listed as necessitating the rejection of sugar beet stecklings for planting material in the course of autumn sorting operations in Germany. In this connexion attention is drawn to the increasing prevalence of leaf spot (*Cercospora beticola*) [see preceding abstracts]. Special emphasis is also laid on the exclusion of all plants affected by heart and dry rot [boron deficiency: *R.A.M.*, 22, p. 90], which act as foci of decay in storage.

De Zeeuw (D. J.) & Andersen (A. L.). **Response of Pea varieties to dry and slurry methods of seed treatment.**—*Phytopathology*, 42, 1, pp. 52–56, 2 figs., 1952.

All the fungicides used in tests of pea seed treatment against [unspecified] damping-off [*R.A.M.*, 30, p. 134; 31, p. 264] in 1949 and 1950 at the Michigan Agricultural Experiment Station, viz., ceresan, ceresan SF, ceresan M, phygon XL, and spergon, proved beneficial to susceptible varieties under most conditions. In general, varieties most susceptible to damping-off responded best to seed treatment as shown by improved stand and vigour. Of all the varieties tested, Alaska Wilt-Resistant was most sensitive to injury from treatment with moderate and light dosages of ceresan M in water or methocel slurry [ibid., 30, p. 504 and next abstract]. Of the 20 varieties used in the experiments, Gradus, Improved Stratagem, and Laxton's Progress appeared to benefit by seed treatment with ceresan M water slurry, whereas the same procedure resulted in severe stunting and stand reduction in Large White Marrowfat, Little Marvel, Premium Gem, Dwarf Gray Sugar, and Melting Sugar. The reaction of the other varieties, including Dwarf Telephone, Giant Stride, and Hundredfold, was intermediate.

Andersen (A. L.). **Control of Bean anthracnose in Navy Pea Beans by seed treatment.**—Abs. in *Phytopathology*, 42, 1, p. 1, 1952.

Of 30 fungicides tested [at the Michigan Agricultural Experiment Station] for the control of anthracnose (*Colletotrichum lindemuthianum*) on Navy pea bean [*Phaseolus vulgaris*] seeds [*R.A.M.*, 30, p. 502], only vancide 51 [see above, p. 331] proved effective. In the greenhouse its application at 7·5 or 15 per cent. in a 2 to 3 per cent. methocel slurry [see preceding abstract] for 10 to 40 minutes proved more satisfactory than 40 minutes' immersion, which was deleterious to the seed and materially impaired germination. In the field, too, the disease was virtually eliminated by the slurry treatment with vancide at 5 to 10 per cent.

Ellis (D. E.). **Ascochyta leaf spot of Bean in North Carolina.**—*Plant Dis. Reptr*, 36, 1, p. 12, 1952. [Multilithed.]

Since 1948 a leaf spot of pole and bush varieties of snap beans (*Phaseolus vulgaris*) and Lima beans (*P. lunatus*), with which a species of *Ascochyta* is consistently associated, has been repeatedly observed in the commercial bean producing areas of western North Carolina; the disease was also present in Duplin County,

eastern North Carolina, in June, 1951. The fungus appears to agree with *A. phaseolorum* [*R.A.M.*, 31, p. 208], though its spore size and other morphological characters appear to fall within the range of those of *A. abelmoschi* on okra (*Hibiscus esculentus*) [ibid., 30, p. 302]. Cross-inoculations showed that okra isolates were pathogenic on pole and bush varieties of snap bean (Kentucky Wonder and Tendergreen) and Lima bean (King of Garden and Henderson Bush), while bean isolates were pathogenic on okra (Louisiana Green Velvet). The symptoms produced by the different isolates on each host appeared to be indistinguishable, the results suggesting that one species of *Ascochyta* may be responsible for the disease of both beans and okra. Further work is in progress.

Drechsler (C.). **Bean stem rot in Maryland and Delaware caused by several Pythium species.**—*Plant Dis. Reptr*, 36, 1, p. 13, 1952. [Multilithed.]

In June, 1946, *Pythium myriotylum* [*R.A.M.*, 7, p. 2; 22, p. 373] appeared in a greenhouse at the Plant Industry Station, Beltsville, Maryland, as the pathogenic agent in more than a dozen bean (*Phaseolus vulgaris*) seedlings which were falling over. In all the affected plants a basal portion of the stem, extending 2 to 5 cm. above the soil line, was much softened and pale brown. In July, 1951, the same fungus was proved to be responsible for a wilt of potted bean plants 30 to 35 cm. high, in a greenhouse adjacent to the one in which the stem rot had occurred in 1946. The stem bases were not much softened nor conspicuously discoloured, but appeared to be in a somewhat flattened or collapsed condition for 5 to 10 cm. above ground level.

Bean plants affected by cottony rot at the Plant Industry Station, either in greenhouses or in field plots in hot weather are usually infected by *P. butleri* [*P. aphanidermatum*: ibid., 30, p. 502]. However, in August, 1951, those in an irrigated field near Frederica, Delaware, suffering from a soft watery fungal rot from ground level up to the lower branches were infected by *P. ultimum* [ibid., 13, p. 799; 18, p. 497; 30, p. 419], which was isolated from the affected parts.

Hoffman (J. C.) & Kanapaux (Margaret S.). **Wade, a new all purpose snap Bean.**—*Seed World*, 70, 2, pp. 38–39, 46, 1 fig., 1952.

Wade, a new snap bean [*Phaseolus vulgaris*] variety released in 1949, was developed from a cross made in 1944 between a selection (B1187–1–6) of U.S. Refugee No. 5 (male parent) and a selection from Burpee's Tender Pod (female parent) at the Southeastern Vegetable Breeding Laboratory of the Bureau of Plant Industry, Charleston, South Carolina. It is resistant to the viruses of bean mosaic [*R.A.M.*, 31, p. 266], bean pod mottle [ibid., 31, p. 218], and New York 15 mosaic [loc. cit.] and to powdery mildew [*Erysiphe polygoni*: ibid., 31, p. 266].

Thomas (H. R.), Jorgensen (H.), & Wester (R. E.). **Resistance to downy mildew in Lima Bean, and its inheritance.**—*Phytopathology*, 42, 1, pp. 43–45, 1 fig., 1952.

Lima beans [*Phaseolus lunatus*] in large canning and freezing areas in New Jersey, Delaware, and Eastern Shore, Maryland, have sustained heavy damage every year since 1945 (except 1947) from downy mildew (*Phytophthora phaseoli*) [*R.A.M.*, 29, p. 204], and tests were therefore carried out at the Plant Industry Station, Beltsville, Maryland, on 113 foreign and domestic collections in a search for sources of resistance to the disease. Four lines showed a high degree of resistance, namely, P.E.I. (Plant Exploration and Introduction) Nos. 164155 and 163580 from India and Guatemala, respectively, 8747 from the south-eastern United States, and 4931, line L-37, from California. In the field sporulation on the resistant lines is scanty, while young plants inoculated in the greenhouse may develop necrosis, sometimes accompanied by limited sporulation.

The response to inoculation with *P. phaseoli* of the F_1, F_2, and F_3, and of F_1 plants back- and out-crossed to the susceptible commercial parents, Thorogreen, Fordhook, and Concentrated Fordhook, demonstrated that resistance is controlled by a single dominant gene.

Graham (J. H.). **New wildfire symptoms on Soybean.**—*Plant Dis. Reptr*, 36, 1, p. 22, 1952. [Multilithed.]

In North Carolina the soy-bean wildfire pathogen (*Pseudomonas tabaci*) [*P. tabacum*: *R.A.M.*, 30, pp. 258, 443; and above, p. 313] was isolated from stems, petioles, and discoloured tissues of pods, and from seed under the discoloured areas. Irregular, brown lesions were very numerous on the stems of susceptible varieties. Brownish spots and streaks were also found on the pulvini, petioles, and petiolules. On pods the infected areas were dark brown and somewhat water-soaked, with occasional lighter brown necrotic streaks near the margins. Similar watersoaked pod lesions were produced by inoculation of greenhouse plants. In some instances both *P. tabacum* and *Xanthomonas phaseoli* var. *sojensis* [loc. cit.] were isolated from the same lesion. Leaf lesions without the typical chlorotic zone were found and are believed to have been caused by the wildfire organism. They were circular, light brown, necrotic areas, 3 to 8 mm. in diameter, with dark brown borders and usually a minute dark centre. This type of lesion probably develops when the tissue surrounding the infection site is congested with water.

Nikolić (V.). Једна нова болест на соји код нас — претходно саопштење. [A new Soy-bean disease in our country—Preliminary note.]—Заштита Биља [*Plant Prot., Beograd*], *1951*, 8, pp. 39–40, 1951. [English summary.]

At the Institute for Plant Protection, Zemun, Yugoslavia, *Peronospora manshurica* [*R.A.M.*, 31, p. 45] was identified on soy-beans received from Bogatić, Mačva. There appears to be no previous record of the disease in the country and it was probably introduced on imported seed.

Atkins (J. G.) & Lewis (W. D.). **Rhizoctonia aerial blight of Soybeans in Louisiana.** —Abs. in *Phytopathology*, 42, 1, p. 1, 1952.

In 1951 *Rhizoctonia* aerial blight was more severe in Louisiana on certain soy-bean varieties, e.g., Dortchsoy 31 and Ogden, than the other common foliar pathogens. The symptoms ranged from definite lesions to total destruction of leaves, petioles, pods, and young stems, accompanied in severe cases by quasi-complete defoliation. Infection of leaves 2 to 3 ft. above soil-level was frequent, with typical mycelial production on or between the leaflets. Sclerotia of the *R. microsclerotia* [*R.A.M.*, 31, p. 302] type were formed in profusion. Isolates from soy-bean caused leaf blight on the same host, snap bean [*Phaseolus vulgaris*: ibid., 29, p. 600], Lima bean [*P. lunatus*], cowpea, fescue [*Festuca* sp.], trefoil, *Lespedeza*, fig, and tung [*Aleurites* sp.]. Under favourable environmental conditions the disease constitutes a potentially grave threat to soy-bean cultivation.

Dias (H. F.). **Uma virose da Alface. Sua transmissão pelos afídeos.** [A virosis of Lettuce. Its transmission by aphids.]—*Agron. lusit.*, 13, 2, pp. 153–169, 3 pl., 1951. [English summary.]

A mosaic disease of lettuce, which is a limiting factor in the cultivation of the crop round Lisbon, was shown by the author's studies to be related to, if not identical with, lettuce mosaic virus [*R.A.M.*, 31, p. 303]. It was transmitted experimentally by *Macrosiphum pelargonii*, *M. sonchi*, and *Myzus persicae*. The first-named was the most efficient and was therefore used for studies on the mechanism of

infection. Feeding periods of three to five minutes on the infective host sufficed for the acquisition of the virus and its subsequent transmission to healthy plants. Deprived of further access to sources of the virus, the aphids lost their infectivity after eight hours. The incubation periods of lettuce mosaic virus, transmitted by *M. pelargonii*, in *Lactuca* [*sativa* var.] *angustana*, *L. livida*, *L. saligna*, *L. scariola* [*L. serriola*], and *L. serriola* ranged from 13 to 20, 11 to 19, 28 to 32, 18 to 25, and 15 to 17 days, respectively. The virus was also conveyed by *Myzus persicae* to *Carduus broteroi*, *Urospermum picroides*, peas, and *Lathyrus sativus*.

FREITAG (J. H.). **Seven virus diseases of cucurbits in California.**—Abs. in *Phytopathology*, 42, 1, p. 8, 1952.

Seven apparently distinct viruses have been isolated from cucurbits in California, namely, cucumber mosaic, squash mosaic [*R.A.M.*, 31, p. 273], muskmelon mosaic (cucurbit ring mosaic), wild cucumber mosaic, cantaloupe mosaic [loc. cit.], western watermelon mosaic, and muskmelon vein necrosis, of which the two last are reported for the first time. The host range of all these viruses, except cucumber mosaic, is limited. The cantaloupe and watermelon mosaic viruses are effectively transmitted by the melon and green peach aphids [*Aphis gossypii* and *Myzus persicae*, respectively] during short feeding periods after starvation. Beetles, but not aphids, were shown to be concerned in the transmission of the squash, muskmelon, and wild cucumber mosaic viruses. Muskmelon vein necrosis was transmitted in preliminary trials to several varieties of its own host. Necrosis of the veinal tissue leads to foliar desiccation and produces irregular, necrotic, corky areas along the stem. The seven viruses are separable on the basis of symptoms, insect vectors, and physical properties.

EPPS (W. M.) & BARNES (W. C.). **The increased susceptibility of the Palmetto Cucumber to downy mildew in South Carolina.**—*Plant Dis. Reptr*, 36, 1, pp. 14–15, 1952. [Multilithed.]

The increased susceptibility to downy mildew [*Pseudoperonospora cubensis*: *R.A.M.*, 30, p. 504] shown in 1950 and 1951 by the previously very resistant Palmetto cucumber variety [loc. cit.] in South Carolina has made necessary a fungicide programme as intensive as that used before Palmetto was developed.

STEERE (R. L.). **Virus increment curves obtained from counts of particles in clarified plant juice.**—*Amer. J. Bot.*, 39, 3, pp. 211–220, 1 fig., 4 graphs, 1952.

In studies at the University of Michigan curves showing the increment in number of virus particles following inoculation were obtained for tobacco mosaic virus multiplying in White Burley tobacco plants and for tomato bushy stunt virus in *Datura meteloides*. Samples of infected tissue were homogenized, diluted, clarified, diluted further with a suspension of indicator particles, and deposited as droplets on prepared specimen films. From counts of the virus and indicator particles in electron micrographs of drop residues, and the known indicator particle concentration and dilution factors, the concentration of virus particles in each sample was determined.

The normal particle increment curves for both viruses resemble standard sigmoid growth curves and those of autocatalytic reactions. An initial unresolved phase is followed by a logarithmic phase at 20 to 72 hrs., and during this period the virus concentration doubles every four hours. Next comes a maximum stationary phase, in which up to 11·7 per cent. dry weight of the leaf tissue may be present as virus particles. Particle curves of infected plants kept at 38° C. revealed immediate cessation of virus multiplication when this temperature was applied 54 hours after inoculation and delayed cessation when applied after 24 hours.